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ON THE PARASITIC NATURE OF CANCER.¹

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IN making an investigation into this subject it is necessary to take for comparison a condition where undoubted parasites produce changes in an organ or tissue which are equivalent to a new growth. For this purpose psorospermiosis in the liver of the rabbit is generally admitted to be a typical condition, and a careful study of the changes found there, and the relation of the parasite to the newly formed tissue, should be fully determined in the first place, so that the process can be followed out in the cells of a growing carcinoma, where, from the arrangement of the tissues, this is infinitely more difficult.

On cutting into one of the small nodules found in the rabbit's liver, a substance can be expressed having a yellowish tint; this is found under the microscope to consist of large oval bodies, with others of smaller size varying in form, epithelium shed from the bile ducts, and leucocytes. On making sections through one of these nodules it is found to be composed of dilated bile ducts, the spaces in which are filled by masses of the material just described. The large oval bodies are seen, some free in the cavities, others wedged in between the epithelial cells lining them; the smaller, rounded forms occupy the same positions. It is evident that having proceeded so far, it is necessary to find some means by which these parasites in their various forms can be differentiated with absolute certainty from the cells of the bile ducts, for otherwise their relation to one another cannot possibly be determined.

¹ Read before the Association of American Physicians, at Washington, May, 1893.

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This can only be done by double staining in such a manner that the parasites are colored distinctly from the cells of the part and their nuclei, and this staining must be uniform throughout the section and not in patches, and every section must stain alike.

After trying a large number of coloring agents, I have succeeded in producing a double stain which will fulfil these conditions.

It is made as follows: Dissolve 2 c.c. of aniline oil in 10 c.c. of cologne or rectified spirit, make up to 100 c.c. with distilled water, and filter. This makes practically a saturated solution. With this aniline water make a 2 per cent. solution of rosanilin sulphate for stain No. 1, and a 1 per cent. solution of iodine (not methyl) green for solution No. 2.

To use the stain, filter No. 1 into a watch-glass, and place in it some sections of rabbit's liver which have been hardened in alcohol, and leave them in for ten minutes. Remove, and wash them in water to remove superfluous stain, then wash slightly in ordinary alcohol and place them in a watch-glass of filtered No. 2. It is better not to time them in the second stain, but to take them out and examine in distilled water, and when the original red color has become changed to a dull purple the staining will have proceeded far enough. Then wash thoroughly in distilled water until all excess of color has been removed, then wash in ordinary alcohol until no more color comes away, clear in oil of cloves, and mount in xylol balsam. On examining a section prepared by the above method, it will be seen at once that there is no difficulty in differentiating the parasites from the tissues affected by them.

APPEARANCES PRESENTED BY THE PARASITES.

1. Large oval cells, each with a capsule stained slightly a dull red, having inside a mass of material which has been stained a brilliant red.

2. Shrunken, wrinkled capsules, some empty, some with a small mass of granular material in them, which, however, has not taken the bright red stain. A few of these empty capsules show a number of sharply defined black granules.

3. Large oval cells without a capsule, having a granular appearance, the whole stained slightly a dull reddish color. In addition to these are cells of the same character, but round in outline. These are probably the large oval cells in transverse section. These cells vary. Some show a coarse granulation amounting to a network, while in others the granulation is very minute. Some also show a small round nucleus. Their size also varies, but the smallest is many times larger than any single columnar cell lining the bile ducts.

APPEARANCES PRESENTED BY THE ALTERED TISSUES.

A section through the dilated bile ducts shows a number of spaces or cysts lined with columnar epithelium, and into these spaces project papil-

lomatous folds which branch and are also covered by columnar epithelium. These folds consist of fibrous trabeculæ, varying in thickness, having a homogeneous basement membrane on which the epithelium is situated. In the more delicate trabeculæ—that is, those most recently formed—the connective tissue is in process of development, and contains a large number of young connective-tissue corpuscles.

At the base of these folds this young connective tissue can be seen penetrating the liver substance and isolating the liver cells, so that in the substance of some of the folds one or more rows of liver cells are still left surrounded by connective tissue.

ACTION OF THE STAINS ON THE TISSUES.

The green stain has picked out all the nuclei by its action on the nuclear network, with the exception of the older connective-tissue corpuscles. By this stain the nuclei of the columnar cells covering the trabeculæ in folds are seen to be small, narrow, oval in shape, having a comparatively thick network; the nuclei of the liver cells at the base of the folds are much larger, round, or slightly oval, and have a finer network. The nuclei of the young connective-tissue corpuscles are of the usual character, and the leucocytes have taken the stain very deeply. These are the only elements stained by the green.

The fibrous tissue and protoplasm of the liver cells are stained a purplish red, and the protoplasm of the columnar cells has taken the same tinge, the color being darker in the liver cells than in the other two.

THE RELATION OF THE PARASITES TO THE ALTERED TISSUE.

Taking a section which has been cut as thin as possible, and in which the different elements have been differentiated as described above, we find, in the first place, a mass of parasites filling up the spaces between the folds, a number of them being a bright red, the others having only a faint tinge of dull red; amongst these are a number of desquamated columnar cells in various stages of disintegration; their nuclear network, however, is stained brightly with the green. There are also a number of deeply stained small round cells (green) which appear to be leucocytes. On examining the epithelium, we find wedged in between the cells a number of the parasites, some in the capsulated form a brilliant red, others a dull red, with no capsule. They are plainly wedged in between the cells, and reach down to the basement membrane. It is, however, a difficult matter to get at the exact relationship of one to the other in the section of the fully formed fold. But if we look for a small bile duct in which the process of dilatation is only just commencing, it becomes an easy matter to understand it. There are a number of small bile ducts to be found at the base of the folds which contain several parasites, and

in proportion to the number of these has the process of dilatation advanced. In the smallest a few parasites are seen, one or two adult forms, while there may be five or six that have not developed a capsule; the majority, however, are free in the lumen of the duct, a few are wedged in between the cells. In some ducts the process has gone further, and small folds are just beginning to form, and in these ducts the lumen is much larger and the parasites more numerous. The relation of the parasites is, however, very plain, and by using a binocular microscope with a high power it can be ascertained beyond a doubt; the parasites that are wedged in between the columnar cells by their growth and presence cause desquamation and disintegration of contiguous cells, but in no case are they contained in the columnar cells. This would be a physical impossibility, as the smallest forms of the parasites are much larger than the columnar cells. It is, of course, possible for the parasite, in an early stage of its growth, to get inside a cell and expand it as it grows. I cannot, however, find any parasite small enough to do this, neither do any of the columnar cells show evidence of any displacement of their nuclei, which must take place if another body was growing inside them.

On examining some of the large cells that have no capsule, a few will be found which have had a portion cut off in making the section. These cells show a margin of granules, while the centre is free from them. This shows that the granules are on the outer margin of the cells, and the binocular microscope confirms this view. We have, then, a large oval cell having a granular covering. On examining a number of these, it is at once apparent that this granular covering varies very much in different cells. In some it is very fine and difficult to make out, having scarcely any appreciable thickness, in others the granules are much larger and the coating is thicker. Further examination shows that this granular covering increases in thickness and in the size of its elements until definite patches are seen covering the cell. In some this change has gone on until the cell is almost covered; this is the development of the capsule, and the appearances described might easily be considered as the expansion of one cell by the growth of another inside it. All these stages in the development of the capsule can be seen going on in the spaces of the dilated bile ducts. It seems to me that this explains the view held by some that the parasite inhabits the cells of the bile ducts. If we consider the enormous number of parasites that are found free in the spaces of the dilated bile ducts, and the very small number that are found wedged in between the cells, also that every stage in development is going on in those lying free, and also take into consideration the fact that the smallest form of the parasite that we can detect is very much larger than the columnar cell of the bile duct, it seems to me that we must accept as a fact that the action of the parasites is simply one of chronic irritation caused by their rapid multiplication in the lumen of

these vessels. This is a very important consideration, as we do not know how far, in many cases, new growths are produced simply by chronic irritation. I have seen several cases where horny growths which had existed for many years were converted into epitheliomata by the action of irritants. In another case, where lycopodium had been used as a dressing, I found the seeds deeply imbedded in a new growth. They may, of course, have had nothing to do with the formation of the neoplasm. But in a case of villous growth in the bladder removed by Sir Henry Thompson, I found a wheat-straw imbedded in its centre. In this case I have no doubt the new growth was caused by the foreign body.

The next question to be considered is the cancer parasite and its relation to the cancer cell. On reading the recent literature on this subject, the first thing that strikes one is the diversity of opinion that exists as to the appearances presented by the parasite and its frequency, some observers finding it in every case in such numbers that it could be estimated by weight, while others found it in only about 4 per cent. of the cases examined. From the illustrations given, it would seem that all the observers were not looking at the same object. Some give special methods of hardening the tissue, while others found the parasite in material hardened in the usual manner. To test the value of these special methods, and find out what their action would be on tissues, I hardened portions of a fresh cancer by the methods used in my laboratory, and also by bichloride of mercury, osmic acid and Müller's fluid, and some other methods described by different observers; at the same time I hardened portions of normal ox liver by all these processes. Sections were made of all the material and stained with logwood, and also with the special stain I have already described. The sections of cancer and liver hardened in the usual manner showed the normal liver as it is known to be, while there was nothing to be seen in the sections of cancer which could be considered parasitic; but in the sections hardened in bichloride of mercury and in osmic acid and Müller's fluid, both liver and cancer were so much altered by the hardening process that it was not difficult to realize how the characteristic organism of cancer could be found and estimated by weight. Those observers, however, who have only found the so-called parasite in a small percentage of the cases examined, have not been describing effects produced by bad hardening; the appearances they have figured I have long been familiar with. They are, I think, capable of a different explanation than that given. I have gone over the large collection of cancer specimens I have made in the last fourteen years, and I find these appearances in only a few of them. In 1879, while working at karyokinesis, I obtained a specimen of cancer in the fresh condition, which, after hardening, showed in the section a number of very large cells. In these I found mitotic division most beautifully shown, but the process was going on inside the large cell; the original

cell was enormously enlarged, its nucleus and some of its protoplasm pushed to one side, while in the centre was a small mass of protoplasm containing a nucleus. This nucleus, in various cells, showed all the stages of mitotic division, from the simple aster to two fully formed nuclei. I considered this to be a typical example of the endogenous division of cells. In 1886 I photographed this specimen amongst a number of others, showing various conditions in cancer development, and in 1891 I used this as an illustration of endogenous division in my work on *Practical Pathology and Morbid Histology*. I have only a few cases in which this process appears.

For the purpose of studying the parasitic nature of cancer I have used cases where the development of the cells can be observed, such as in the axillary glands, where the process is secondary to carcinoma mammæ, and where the operation was performed in an early stage of the disease, and also in cases where recurrence had taken place and the growth had been removed twice or three times. In recurrent cancer of the breast small nodules are found in the muscles, and their development and relation to the muscular tissue is very interesting. Examining that portion of a section which shows the cancer cells invading the muscles, changes in the muscular fibres which are at some little distance from the cancer cells are at once apparent. Some of the fibres show spaces in their substance somewhat similar to the appearances found in striped muscle in cases of myxœdema; in others, the muscle substance is completely broken up and the muscle corpuscle is seen as a shrunken nucleus surrounded by an empty space. All these changes take place before a single cancer cell is in apposition with the muscle fibre.

The next change is the appearance of one or two cancer cells in the centre of the broken-down muscle fibre. These increase until the fibre is replaced by cancer cells and the sarcolemma is either changed into fibrous tissue or is replaced by it. The method by which the cancer cells gain access to the centre of the muscle fibre is not apparent, and requires further investigation. In all these cases active growth of the cancer elements can be accurately observed, and I hold that where a pathological process is in an active stage of development, there the cause, if capable of demonstration, should be found. I considered that in these cases I ought to find the parasite, if the disease process were caused by one. The most careful examination of a number of cases has failed to show anything that could be construed into any form of parasite—that is, in those sections hardened by a method which gave normal appearances in sections of normal liver.

When we consider the many different forms of cancer, it does not seem possible that they can be the result of the action of any one form of parasite; and, further, when we study the differences between two forms, such as squamous epithelioma and glandular carcinoma, we find

the differences so marked that, although they have certain points in common, yet they are practically different diseases. In squamous epithelioma we have a condition in which the epithelium receives some impetus at a certain point which causes it to grow downward into the tissue below, and there to branch out in every direction. It is at the one point, however, that the growth takes place, and the newly formed epithelial tissue will grow sideways under the normal epidermis without having any effect on it. It has also no effect upon the fibrous connective tissue into which it grows, as a rule. I have, however, seen an enormous hyperplasia of yellow elastic tissue produced by the growth of an epithelioma in the eyelid.

On the other hand, we have a glandular carcinoma, starting in secretory epithelium, and consisting of cells derived from this epithelium, and in every case this new growth affects the fibrous connective tissue in such a manner that a supporting framework is formed for it as it grows, and in this are contained new bloodvessels for its nourishment. Although these two forms differ so much in their construction, there is one point of absolute resemblance between them. A cell from either form, on being carried to a distant organ, will at once reproduce a cancer of the same type as that from which it started. It therefore follows that if a parasite is required, it must be the cell itself; but that gives no explanation as to how the first cancer cell became cancerous.

Sarcoma must be considered on an entirely different basis. Where I have been enabled to examine a sarcoma in its earliest condition, that is, where a young growth is starting in connection with an established sarcomatous condition, I have found that it always consisted of embryonic connective tissue, and, according to my observations, all mesoblastic neoplasms begin in this way. Whether they receive the impetus which decides that they are to become sarcomata or to remain benign at the commencement or later in their growth, would seem to vary in different cases.

CONCLUSIONS.—1. The dilatation of the bile ducts in the liver of the rabbit is caused by the chronic irritation produced by the multiplication of the *coccidium oviforme* (Leuckart) in them, and the appearances which have given rise to the view that these parasites are developed in the columnar cells of the bile ducts are caused by the different stages in the development of the capsule.

2. The appearances found in a small percentage of glandular carcinomata are caused by endogenous cell-formation; the large majority of glandular carcinoma show nothing which can be considered parasitic when hardened by any method which, when applied to normal tissue, will give a typical normal section.

THE INTESTINAL ORIGIN OF CHLOROSIS.¹

BY F. FORCHHEIMER, M.D.,
OF CINCINNATI.

THE object of this paper is to show that chlorosis is produced by changes that take place primarily in the small intestine. Sir Andrew Clark, in an excellent paper on "The Anæmia and Chlorosis of Girls, occurring more commonly between the Advent of Menstruation and the Consummation of Womanhood" (*Lancet*, November 19, 1887), and indirectly Bunge, Landwehr, and Kobert (*St. Petersburger med. Wochenschrift*, 1891), have called attention to the connection between intestinal processes and chlorosis, so that the fact has been admitted that such connection exists. The following may go to show how chlorosis originates in the intestine.

The characteristic blood condition of chlorosis is oligochromæmia—a diminution of hæmoglobin for each red corpuscle without even approximately great diminution in the number of red corpuscles. It is unnecessary to add that a clinical diagnosis could not be established from blood examination alone; that oligochromæmia occurs as a physiological condition, or that some individuals, apparently in the best of health, are oligochromæmic. Accordingly, oligochromæmia would bear the same relation to chlorosis that glycosuria does to diabetes mellitus.

A diminution in hæmoglobin can occur from two causes only: either the destruction of hæmoglobin becomes abnormally great or the formation becomes abnormally small. As far as we know, destruction of hæmoglobin is always associated with destruction of the red corpuscle; our definition of chlorosis, then, would preclude the possibility of this disease being due to destruction of hæmoglobin. But let us admit that a separate destruction of hæmoglobin and red corpuscle can exist—a condition hinted at by many authors; it will then become necessary to prove that, commonly, at least, this does not occur in chlorosis.

The formation of the stroma and the hæmoglobin of the red corpuscle consists of two distinct acts, as is proven by their first appearance in the mesoblast during foetal life, and in extra-uterine life by the behavior of the erythroblasts of Bizzozero. We have first the stroma and then the coloring matter, and, therefore, it is not unreasonable to suppose that normal (numerically) cell-formation might go on with diminished hæmoglobin-production (chlorosis) or normal hæmoglobin-formation with diminished corpuscular production, either process causing a diseased condition.

¹ Read before the Association of American Physicians, Washington, D. C., June 1, 1893.

That there is no appreciable destruction of hæmoglobin in chlorosis can be proven by an examination of the urine in all cases in which the hæmoglobin sinks to 60 per cent. or below (Fleischl's hæmometer). My attention was first called to this fact by a routine urinalysis in the case of a Russian girl, when the so-called urophæin test of Heller was followed by a negative reaction. In this girl, a characteristic imported case of chlorosis with hæmoglobin 40 per cent. and red corpuscles 3,975,000, the urine was found as usually described—"copious, pale, acid, of low density, somewhat deficient in urea, and always prone to speedy decomposition" (Clark). As the urophæin test is supposed to be produced by all the coloring matters of the urine except the urine-indican, it became necessary to determine whether urobilin was present or not. A chloroform extract treated with iodine and dilute potassium hydrate gave no fluorescence (Gerhardt's test), and, practically, no green color, so that, when this examination had been repeatedly made, the conclusion could not but be formed that urobilin was practically absent. As urobilin is one of the end-products of bilirubin, and the quantity of bilirubin depends upon the destruction of the red corpuscles or their hæmoglobin, it would seem to follow either that there is failure of absorption of hydro-bilirubin from the intestine or lack of formation. There is no diminution in the absorptive function of the small intestine, so that there must be less hæmoglobin destroyed than normal. The fact must be mentioned that in chlorosis of less degree there is not always an absence of urobilin; this can be explained by taking into consideration the quantity of hæmoglobin; with the destruction of an equal number of red corpuscles it is sufficient at times to produce the urobilin reaction, but not always. The statement can be made, then, that chlorosis is not due to hæmolysis, either of corpuscles or of hæmoglobin, but must be due to faulty hæmopoiesis, as far as hæmoglobin is concerned, and, possibly in severe cases, secondarily even as to red corpuscles.

Little has been done on the origin of hæmoglobin. It has been known for some time that after a full meal the amount of hæmoglobin sinks, but this can be satisfactorily explained by the dilution of blood due to absorption of fluid. From an experimental therapeutic standpoint, much has been done; but the results are so variable that they may be called inconclusive. It would seem a simple matter to prove or disprove the absorption of iron or iron-containing albumins from the intestine, yet, with the technical difficulties and the incomplete establishment of physiological data, this has not been the case. So that it became necessary to make a series of experiments which had reference to hæmoglobin only. In these the question of iron absorption or excretion, or the conversion of hæmoglobin, could be abstracted from entirely; and direct, comparative observations of hæmoglobin could be made. The object of

the first series was to determine whether hæmoglobin was formed in the intestine, having previously had conclusive evidence that hæmoglobin-formation could be increased by the introduction of certain substances not containing iron into the intestine of patients. Rabbits were chosen for the observations, purely for the purpose of convenience; during full intestinal digestion they were put upon the rabbit-holder, the abdominal cavity was opened, and blood was examined from the terminal branch of the mesenteric artery and its accompanying beginning of the mesenteric vein. Care was taken to open the bloodvessels as near as possible to the entrance or exit, so that arterial blood was examined immediately before it went into the capillaries of the intestine, and venous blood directly it came from them. As the result of forty observations, the average is as follows:

In the artery: Red corpuscles, 5,362,000; hæmoglobin, 78 $\frac{3}{4}$ per cent.

In the vein: Red corpuscles, 4,540,000; hæmoglobin, 78 $\frac{3}{4}$ per cent.

From which we deduce as follows: The number of red corpuscles is diminished in the veins, while the quantity of hæmoglobin remains the same; therefore hæmoglobin is absolutely increased in the vein and each red corpuscle carries more hæmoglobin in the vein than in the artery. The dilution of venous blood during digestion must be taken into consideration; this would, probably, also account for the diminution of red corpuscles. If the blood contains 78 $\frac{3}{4}$ per cent. hæmoglobin before going through the capillary circulation, takes up fluid there, and comes into the veins containing 78 $\frac{3}{4}$ per cent., it certainly follows that hæmoglobin is increased in the vein. As a result of calculation it will be seen that each red corpuscle carries about 18 per cent. more of hæmoglobin in the vein than in the artery. The only other explanation, that the quantity of hæmoglobin remains stationary in the arteries and veins, can, therefore, be rejected.

From this observation the conclusion can be drawn that, in the rabbit, hæmoglobin is taken up by the blood from the intestine, and that it must be formed either in the parts supplied by the arteries—*i. e.*, the mucous membrane in its broadest sense—or within the lumen of the intestinal canal. It does not seem to be going too far to extend this view to the human being when corroborated by other testimony.

It has been stated that the quantity of hæmoglobin is diminished after a full meal, but, to my knowledge, no investigation has been made as to the influence of intestinal digestion upon hæmoglobin-formation. It was necessary, therefore, to examine the blood at this time in order to determine whether the view expressed before could apply to the human being. Fifteen adults whose histories were known were examined in the following way: the blood was examined before they sat down to the heaviest meal of the day and from three to four hours afterward, with the following average result as to red corpuscles and hæmoglobin. In

all cases but one there was a decided increase in the number of red corpuscles and in hæmoglobin. Before the meal hæmoglobin was present as 86 + per cent., and red corpuscles as 4,905,000; after the meal hæmoglobin 89 per cent. and red corpuscles 5,044,000—so that there was an absolute increase of hæmoglobin of nearly 3 per cent., and a slight increase in hæmoglobin for each red corpuscle after the meal (represented by the fraction $\frac{2861}{4,905,000 \times 5,044,000}$). It will be seen, then, that a

large quantity of hæmoglobin is added to the circulation during intestinal digestion, and that the number of red corpuscles is increased, so that, although the simple experiment of the rabbit cannot be carried out upon the human being, its results can be fully applied to the latter.

A very practical result of these examinations is that, for comparative observations upon the same individual, the examination must always be made at the same time of the day and in approximately the same relation to a meal. This has been done in all the examinations to be reported upon further on.

It now having become apparent that hæmoglobin was formed in the intestine, and that the lack of formation could be looked upon as the cause of chlorosis, it seemed feasible to attempt a solution of the problem why hæmoglobin was not formed in sufficient quantity in this disease. Two ways were open: first, by means of therapeutic attempts; and, secondly, by direct investigation; the former the easier of the two, but to be referred to later.

Three litres of urine, with the following general characteristics, were taken from a chlorotic patient: acid reaction, sp. gr. 1012, pale color, indican increased, urophæin diminished, urobilin test negative, no albumin, no sugar. After having been filtered there was added three times the quantity of alcohol, drop by drop, which was followed by the production of a flocculent, not very copious precipitate; this was then put through a filter. The process of filtration was very slow, taking fully forty-eight hours, and when the attempt was made to re-dissolve the precipitate in distilled water, it was found impossible to do so. The substance was then obtained by drying upon the filter. In order to find out whether it had toxic properties, a small quantity was rubbed up in water and injected into the subcutaneous tissue of a rabbit. In small doses it produced elevation of temperature, apathy, loss of appetite, and loss of muscular power; in large doses, the following symptoms were noticed, the rabbits dying about eleven hours after injection: First, about three-quarters of an hour after the injection, rapid elevation of temperature ($103\frac{1}{2}^{\circ}$), and, with this, loss of motion. About an hour after the injection, temperature begins to fall until, just before death, it falls to 91° F. After two hours the animal becomes absolutely motionless, reacting only upon strong stimuli, to be followed by convulsive movements. The

post-mortem examination reveals no evidence of inflammation; the internal organs seem normal with the exception of the lungs and kidneys, both being very much congested. The veins and the arteries contain fluid blood and there is no evidence of clotting anywhere, except in the heart.

The toxicity of this substance being established, an attempt was now made to determine its nature, especially in view of the fact that normal urine is supposed to contain a toxic body (urotoxin). That it is an albumin was proven by the biuret, Millon's, and xanthoprotein tests. Peptones and albumoses (except hetero-albumoses) were excluded on account of insolubility in water. The toxalbumins could be excluded on account of dissimilarity of animal reaction. The body is soluble in NaCl and precipitated by saturation, it is precipitated by $(\text{H}_4\text{N})_2\text{SO}_4$, it is precipitated, like globulin, by CO_2 , so that, in all probability, we are dealing with a double body, a proteose, of toxic properties, the exact nature of which will have to be determined by further investigation.

As to its origin, the statement can be made with a certain amount of certainty: it is an intermediate product between albumin and peptone, which is produced either by putrefaction or digestion in the small intestine, possibly both. It is not improbable that this body is the result of a process which destroys the albumin part of the molecule of the precursor of hæmoglobin. What form this is in, it is too early to determine, although Bunge's hæmatogen-organic iron found in the yolk of eggs is claimed by the discoverer to be destroyed in the intestine by H_2S , just as we imagine the precursor of hæmoglobin to be destroyed in the intestine of chlorotic patients by some active body, either some lower form of life or some enzyme, the result being the poisonous body in the circulation, and prevention of hæmoglobin-formation.

Lastly, I wish to present briefly, the therapeutic evidences I have gathered. Sir Andrew Clark states in his paper that "If in the treatment of this malady I were perforce limited to the employment of one sort of drug, the drug which I should choose for use would be an aperient." In the eleven cases from which I shall draw my conclusions I have used neither iron nor aperients, but have given salol or hydro-naphthol (so called). It will be readily understood why the number of cases is so small when the statement is made that chlorosis of high grade is not very common with us, and that all the cases which I have seen have not been exclusively treated by these drugs. The object of the method was to introduce some substance into the small intestine, so as to prevent abnormal decomposition, and none better suggested themselves than salol, with its salicylic acid, at first, and latterly hydro-naphthol. In order to make the therapeutic tests as pure as possible, no laxatives were administered, but the bowels were emptied by means of agents acting upon the large intestine only (enemata, flushing the large intestine, or glycerin, either as an injection or suppository). The eleven

cases were all females, varying in age from fifteen to thirty-five years; menstrual difficulties were present in seven cases—the most pronounced case claiming to be regular in every respect; constipation was present in six cases, stomach trouble in four. In all the cases the urine presented the chemical characteristics mentioned before. Two of the cases were chronic chlorosis, one of which was cured after a long siege, the other one presenting relapses, so that she cannot be reported as cured. The quantity of hæmoglobin varied at the beginning from 40 to 70 per cent., and the number of red corpuscles from 3,766,000 to about the normal for women. Six of the cases were treated with salol, five with hydro-naphthol, and one with both. The patients were kept under treatment until hæmoglobin reached 90 per cent. or over, and the time of treatment varied from five weeks, as the shortest, to three years in the one case. All precautions were taken to establish accuracy in blood examination (counting a sufficient number of squares in the hæmocytometer, the arrangement of the light for the hæmometer, examination at the same time of day, and with reference to meals, etc.). The results, expressed in general terms, were steady increase in hæmoglobin, interrupted by regular diminution as the result of menstruation and several other causes. When a gain was made, the smallest amount gained in one week was 5 per cent., the greatest 20 per cent. In one patient, the only exception, it took two weeks before the remedy (salol) produced any effect, but in two weeks after that the hæmoglobin had risen from 65 per cent. to 85 per cent. With the rise in hæmoglobin all the patients began to improve; the nearer 80 per cent. the more the symptoms began to disappear, and, from ordinary examination, without blood test, most of the patients would have been willing at this point to have been discharged as cured. In the obstinate chronic case referred to above, the hæmoglobin was just as surely increased as in the others, but as soon as treatment was stopped the hæmoglobin would again sink, so that, after the end of two or three months, the patient would present herself again with hæmoglobin 55 or 60 per cent. In no way, however, could she be looked upon as disproving the effects of these two remedies upon hæmoglobin-formation. Hydro-naphthol seemed, upon the whole, more efficacious than salol, the results being more quickly obtained and the rise being more rapid. If any deduction could be drawn from the different action of the drugs, it would be that salol acts both upon lower forms of life and upon enzymes, while hydro-naphthol probably acts only upon the former. However this may be, both act by causing increase of hæmoglobin, the salol acting, in addition, especially in the direction of producing a decided increase in the number of red corpuscles.

In conclusion it may be stated that, possibly, some other origin for hæmoglobin may exist than in the intestine; from all evidences, however, this is the principal source and in chlorosis the most important.

A CASE OF SUB-CORTICAL CYST OF THE LOWER PART OF THE LEFT ASCENDING PARIETAL CONVOLUTION; OPERATION; RECOVERY.¹

BY THEODORE DILLER, M.D.,

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AND

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THE case about to be described is of considerable interest in view of the many and great difficulties which beset the localization of, and operations upon, intra-cranial growths. It confirms, as much as a single case can, the generally accepted ideas concerning the localization of certain motor functions in the Rolandic region. It lends support to the opinion (upon which there is not so much unanimity) that there is no cortical representation of sensation in the pre-central convolution, and also offers distinct negative evidence in support of the view that this convolution is not related to the function of muscular sense. The hypothesis of Seguin,² Mills,³ and others, that when hemiparesis precedes spasm the lesion is sub-cortical, is confirmed by the evidence presented by our case.

From the surgical aspect of the case, the admirable control of hemorrhage during the operation by means of a rubber band around the head is worthy of mention. Other points will be mentioned by Dr. Buchanan in his account of the operation.

Dr. J. B. Murdoch saw the case in consultation with us at the Mercy Hospital in the latter part of July, 1892, when we all agreed upon the diagnosis of an intra-cranial lesion situated in the middle or lower third of the left Rolandic region; and we further agreed upon the propriety of an operation provided anti-syphilitic treatment should prove of no avail.

HISTORY OF CASE AND ACCOUNT OF EXAMINATION OF PATIENT, WITH REMARKS BY DR. DILLER.

J. P., admitted to the Mercy Hospital July 17, 1892. Native of Scotland; aged thirty-five years; single; has always worked as a coal-miner. Uses alcohol moderately. Denies specific infection. Always enjoyed good health up to beginning of present illness. Family history good; no tubercular taint.

He was in good health and working regularly in the mines up to

¹ Paper read before the meeting of the American Medical Association at Milwaukee, June 6, 1893.

² AMER. JOURN. MED. SCIENCES, July, August, and September, 1888.

³ Cerebral Localization.

June 1, 1892. He has been injured several times by coal falling on his head, but not recently, and never severely. The first departure from health he noticed was a "failure of voice." He states that he could not utter certain words, although he could think of them. Soon afterward, he began to lose some power over the muscles of the right side of the face. This paresis increased. Slight paresis of right hand ensued about June 21st (three weeks after appearance of first symptom). Two weeks later he became aware of some loss of power in right leg, the paresis in arm and face having increased in the meanwhile. In the latter part of June he was seized with spells of vomiting which came on both before and after eating. He was troubled with this symptom for about three weeks. In the early part of July he began to be troubled with headache in the left frontal region and extending back to the parietal region on the same side. It came in increasing paroxysms for about a week, during which time it was so severe that he was kept awake much of the time at night. At the end of a week these head-pains began to decrease in frequency and severity, so that four weeks after their onset they had almost disappeared and he could sleep eight hours out of the twenty-four. He suffered from some vertigo in connection with these headaches.

In the early part of July, after paresis of right face, arm, and leg had appeared, he was seized with a convulsion for the first time, which he describes as follows: He was in bed, sleeping, when he was awakened by spasmodic movements in the muscles of the right face and hand, but cannot tell which was first affected. The convulsion was confined to these parts and lasted six minutes. He was entirely conscious throughout the attack.

The second convulsion occurred about July 25th, in the daytime, while he was resting in bed, although not asleep. It involved the parts in the following order: right face and arm, then, shortly afterward, right leg. He was conscious throughout the attack, as well as before and after it. He does not remember the order in which the convulsion ceased.

August 1. Had a third convulsion, which was confined to the hand and forearm; not as violent as the first two.

12th. Had a fourth convulsion confined exclusively to right leg.

15th. Fifth convulsion took place. He was warned of its approach by slight twitchings of muscles on affected side. Attack began in right hand and slowly ascended the arm to the shoulder. Spasm continued in arm alone for one-half to one minute before any other parts were involved. Then right leg and face became involved (does not remember which first). Spasm of leg began in toes and involved successive groups of muscles upward to the thigh. The attack lasted three and a half minutes. Spasm in leg stopped last.

The paresis of right face, arm, and leg, as well as the aphasia, had progressively increased from the time the patient entered the hospital up to the day of the operation, although he had been during this time (about a month) taking large doses of iodide of potassium.

With the assistance of Dr. Buckner, the hospital interne, I carefully examined the patient on August 6th and again on August 15th. The result of these two examinations together will show the condition of the man just prior to the operation. I will speak of these examinations as his.

Status præsens. Male; height, 5 ft. 10 in.; weight, 155 lbs.; well proportioned.

Inspection of scalp reveals presence of scar one-third of an inch long situated a little below and behind the parietal eminence of the left side. Two other quite small scars are noted: one in the median line, three inches behind the coronal suture; the other, one and three-quarters inches to the left of this one. A fourth scar is noted in the parietal region, two and a half to three inches to the left of the median line. This scar is two-thirds of an inch long, horizontal in axis, its posterior extremity ending on a line which marks the Rolandic fissure. Below and above this scar, but principally below it, there is an area of slight depression about as large as a silver quarter-dollar piece.

Motor functions. Distinct paresis of the right arm and hand. Can with great difficulty and only partially raise the forearm upon the arm.

Very marked paralysis of muscles about the shoulder. Able to flex fingers or wrist only very slightly. Power to pronate and supinate arm much impaired. On the whole, the muscles of hand and forearm are much more involved than those of shoulder and upper arm.

Face distinctly drawn to left side; right naso-labial fold almost obliterated. Cannot pucker lips sufficiently to whistle.

Tongue is readily protruded and moved in all directions.

Eyes move readily in all directions; no apparent extra-ocular paresis.

Considerable impairment of power in muscles of right leg, but not nearly so marked as in muscles of right arm. He drags foot on floor in walking, but can distinctly improve his gait by a conscious effort. Can walk nearly as well with eyes closed as when open.

Sensation. He can feel touch of finger or pin at any point on the parietic side. A slight pin-jag causes pain.

Tested with aesthesiometer, he is able to recognize two points two to three inches apart on the inner and outer sides of the right forearm and from one and a half to two inches apart on right palm.

With eyes closed he can promptly distinguish between hot and cold cloths applied to the parietic parts.

Muscular sense. With eyes closed he recognizes a watch, bottle, pencil, or book placed in his hand if assisted in closing his fingers over the object. He can discriminate between several weights and can describe any position in which his affected arm or leg is placed.

Speech. He is frequently at a loss for a word. Says he can think of all words he wishes to express, but cannot always utter the word he has in his mind. Often by an extra effort he can utter words which at first trial he could not utter.

In reading a paragraph from a newspaper he hesitated several times at words and then, after an effort, pronounced them; two or three times dropped words. Says that occasionally a word fails to convey a meaning to his mind (possibly word-blindness). Reads better than he talks.

He understands all the words used in ordinary conversation (absence of word-deafness).

He showed himself able to appreciate the nature and use of a number of objects presented to him (absence of soul-blindness).

Mental condition. There is no evidence of mental deficiency or aberration. Memory, perception, and judgment good.

During three days intervening between the time of the completion of my examination of the patient and the day of the operation, the paresis

in the right arm and hand and the aphasia had quite perceptibly increased. Paresis in fingers had become absolute paralysis.

Eyes were examined by Dr. W. F. Robeson, just before the operation, who submitted the following report:

O. D.—Vn. = 20/xx partly. Jr. 0.06 (10—60 cm.)

O. S.—Vn. = 20/xx partly. Jr. 0.06 (10—60 cm.)

O. D.—Media clear. Nerve round, with scleral ring all around. No choroidal ring. Nerve slightly elevated and vessels large and numerous. Retinal circulation hyperæmic.

O. S.—Media clear. Nerve round, with scleral ring. No choroidal ring or crescent. Vessels full and numerous. Nerve elevated. Retinal circulation hyperæmic.

October 22, 1893 (after the operation), by Dr. F. H. Edsall:

O. D.—Vn. = 20/xx }
O. S.—Vn. = 20/xx } with difficulty.

O. D.—Media clear. Retinal circulation markedly congested. Optic disk very red and hyperæmic, and somewhat raised above the retinal plane. Disturbance shows no special point of interest.

O. S.—Media clear. Retinal circulation markedly congested. Optic disk very red and hyperæmic and somewhat raised above the retinal plane. Disturbance shows no special point of interest.

As before stated, it had been decided to operate in case a course of anti-syphilitic treatment should effect no favorable change. He was placed upon iodide of potassium upon entering the hospital, the dose being several times increased. After a course of four weeks' treatment, during which the symptoms had increased in gravity, we concluded that the disease was not amenable to specific treatment, and it was decided to operate at an early day.

Nearly all the important symptoms of intra-cranial growth were present, viz.: Headache, vomiting, vertigo, convulsions, and paresis.

The important sign of choked disk was not present, but the eye-grounds presented suspicious appearances which were strongly suggestive of the advent of this condition.

But enough symptoms were present to render the diagnosis of intra-cranial growth certain. A brief analytical review of the symptoms from the standpoint of the localizationist may not be amiss.

It is to be noted that aphasia was the first symptom which appeared; paresis of right face next appeared; then paresis of right arm; and then paresis of right leg; after these symptoms had appeared the patient suffered from his first convulsion, which was confined to the right face and arm and lasted six minutes. The second convulsion involved right face and arm and, subsequently, the leg. The third convulsion involved right hand and forearm only. The fourth convulsion was confined to the right leg. The fifth began in the right hand and then spread to the right arm, leg, and face.

The following table will show at a glance the order of invasion and the parts involved in each convulsion:

Convulsions.	Parts first involved.	Parts subsequently involved.
First	Right face and arm.	None.
Second	" " " "	Leg.
Third	" hand and forearm.	None.
Fourth	" leg.	"
Fifth	" hand and arm.	Leg and face.

It will be observed that in four of the five convulsions, the arm was involved first, either alone or with the face; that twice the face with the arm was involved first; that twice the right hand and arm alone were first involved. In only one convulsion was the hand or arm not involved at all. In two the face was not involved.

It will thus be seen that the signal symptom arose in the arm, this member being most frequently involved. This pointed to the arm centre as the seat of the greatest irritation; and as in the one convulsion the spasm was confined to the hand and arm alone, and in another clearly began in the hand, it was reasonable to suppose that the subdivision of the arm centres which is related to movements of the forearm and hand, especially the latter, was most involved.

Turning now from the symptom of convulsion to that of paresis, it has been seen that the right face, arm, and leg were involved. But the arm was distinctly more paretic than either the face or leg. Taking the arm alone, the hand was most affected, the forearm next, and the arm proper and shoulder least.

Motor aphasia was a prominent symptom. But the symptoms referable to the face and arm were much more marked than the aphasia, especially those referable to the arm.

Headache was more or less localized over the anterior half of the left side of the cranium. The largest scar noted was situated over the hand or face centre.

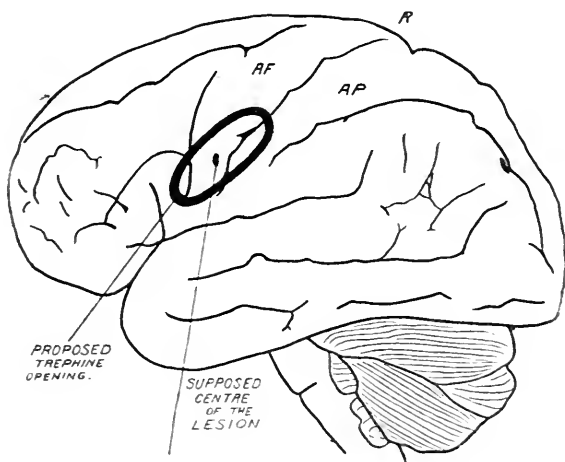
The foregoing considerations made it seem likely that a lesion was located in the left Rolandic region, involving principally the hand centre, but by continuity or pressure involving in an upward direction the other subdivisions of the arm centre as far as those for the shoulder and the subjacent areas below, viz., the centres for the right face and for speech.

Two other signs remained to be interpreted, viz.: (1) the appearance of paresis in one part after another before the first convulsion appeared; and (2) the absence of sensory disturbance of all kinds, including muscular sense. From the fact that paresis preceded convulsions, I regarded the lesion as probably a sub-cortical one. In view of the probable

fact that in the post-central convolution, the motor and sensory areas overlap, I regarded the absence of sensory symptoms as an indication that the lesion was situated anterior to the Rolandic fissure.

It was therefore determined to make an opening in the skull, the centre of which should correspond to the hand centre. It was thought best, both for exploratory and surgical reasons, to make two trephine holes with a large instrument so that the entire opening would be about $2\frac{1}{2}$ inches long and $1\frac{1}{4}$ – $1\frac{1}{2}$ inches wide. We designed to make this opening in a downward and forward direction at a little greater angle than the Rolandic fissure. It was intended that the centre of it should be a little anterior to the Rolandic fissure over the hand centre just above the imaginary horizontal line which divides the arm from the face centre.

The accompanying diagram will in a rude way show the proposed opening in the skull. I am inclined to believe, however, that by a slight



Af. Ascending frontal. *Ap.* Ascending parietal. *R.* Fissure of Rolando.

error in calculation, the actual opening was made about half an inch higher than indicated in the diagram.

OPERATION BY DR. BUCHANAN.

When this patient was admitted to the Mercy Hospital he was first examined by two of the resident physicians, Drs. Gibson and Buckner, who made a diagnosis of morbid growth in the left motor area. He was treated in the medical ward by my colleague, Dr. Moyer, by whom he was later transferred to me as a case suitable for surgical treatment.

The symptoms pointing clearly to a lesion at the middle or lower part of the fissure of Rolando, it became necessary to locate this fissure. I have been led to consider the relative method of Thane the best for this

purpose. This is to locate the upper end of the fissure of Rolando at a point 55.7 per cent. of the distance from the glabella to theinion and to extend a line downward and forward from this, at an angle of 67° , for a distance of $3\frac{3}{8}$ inches. In passing, attention may be called to the ready method of laying off this angle as proposed by Mr. John Chiene, of Edinburgh. This consists in folding a circular paper having a radius of $3\frac{3}{8}$ inches, first into quarters, then into eighths, and then into sixteenths, and taking the angle formed by $\frac{3}{16}$ of the circle. This furnishes the segment of a circle which measures 67.5° , and which gives practically the same result as an angle of 67° . This convenient method of fixing the angle I had accidentally discovered and used before seeing it mentioned in the *American Text-book of Surgery*, edited by Professors Keen and White. The only instrument, therefore, necessary to locate this important fissure is a tape-line, and the only number to be remembered is the proportional distance from the glabella to theinion. For greater convenience I have had a thin sheet of aluminium cut in the form of a segment of a circle, having an angle of 67° and a radius of $3\frac{3}{8}$ inches, and moulded to fit the average skull when its straight sides are applied respectively to the median line and to the part of the scalp corresponding to the fissure of Rolando.

The day prior to the operation, the patient's scalp was shaved and well scrubbed with soapsuds and sublimate solution. The median line and the fissure of Rolando were laid off by the method above indicated with light strokes of the solid stick of silver nitrate. An antiseptic dressing was applied and kept in place till the time of operation. The usual antiseptic precautions were observed. A hypodermatic injection of morphine was given shortly before the anæsthetic was commenced. Two turns of rubber tubing passed firmly around the head above the ears and brow, completely controlled the hemorrhage from the scalp, and proved in this case, as well as in others in which I have used it, a most satisfactory expedient. In order to locate on the skull the position of the trephine holes required, a tenotome was passed to the bone at two points about $1\frac{1}{4}$ inches apart, and on a line parallel with and about $\frac{1}{2}$ inch in front of the lower half of the Rolandic line. Through these small incisions a drill was passed into the external table. A large flap, with its convexity backward and its centre over the position of the proposed trephine holes, and including all the soft tissues, was raised. The centre-pin of a Roberts trephine, having a diameter of $1\frac{1}{2}$ inches, was applied to the lower drill hole and a button started.

About the time the diploë was reached it was found that the trephine was useless; the perpendicular shaft was turning at its junction with the horizontal plate. Another Roberts trephine was applied with its centre at the other drill hole, and notwithstanding great care was used in its manipulation, it also met the same fate. The situation now was somewhat embarrassing. Other trephines were at hand, but none of them reliably aseptic. Fortunately, a good pair of bone-forceps was at hand and by their energetic use an opening was effected sufficiently large to admit the blade of a Hopkins gouge forceps; with these the enlargement of the opening to the size originally planned was easy.

The dura mater was normal in appearance but bulged somewhat, and no pulsation could be seen or felt. The edges of the opening in the bone having been smoothed up, a flap of dura mater was raised with its convexity upward and its borders about two lines from the bone. The

brain tissue was normal in appearance except for some bulging and an entire absence of pulsation. After the motor centres had been located by the electric battery as below described, a sharp probe was passed into the brain substance at about the middle of the opening, but with negative results. Two other punctures were made at intervals lower down. The lowest gave exit to clear fluid. An incision sufficient to admit the index finger was made into the brain tissue, and at the depth of about half an inch a cavity was reached with smooth walls and an oval outline. This was irrigated with distilled water and a rubber drain inserted.

The flap of dura mater was sutured with catgut and the scalp with silver wire. The drain was brought through an incision in the scalp flap.

The rubber tube was withdrawn in three days. The wound pursued the usual aseptic course of healing and, after the recovery from the anæsthetic, it might be said that the patient experienced no ill effects whatever from the operation. During his stay in hospital the pulsation of the brain continued to be plainly seen.

REMARKS BY DR. DILLER.

When the dura beneath the opening in the skull had been turned aside and the convolutions covered only by the pia mater were exposed, a fissure supposed to be the Rolandic was seen running downward and forward. It was situated a little posterior to a line drawn through the middle of the opening in its longest axis, and was more posterior to this imaginary line in the lower than in the upper part of the opening. Two small metal electrodes rendered aseptic, attached to a faradic battery, were applied to the exposed convolutions. Those in the lowest part of the opening were stimulated, first on one side of the Rolandic fissure and then on the other, the electrodes being kept as close together as possible. The convolutions were in this way stimulated at short intervals from the lowest to the highest extremity of the aperture in the skull. No contraction followed until a point on the ascending parietal about the middle of the opening was reached, when distinct movement of the right thumb in flexion took place. The electrodes were then moved across the fissure at a trifle higher point, when their application on the ascending frontal produced contraction of the fingers of right hand. The electrodes were then moved up the ascending frontal convolution to the uppermost limit of the opening, when movement of the wrist, elbow, and shoulder occurred in turn. The ascending parietal was then stimulated at several points in its upper half, but no contractions ensued, the thumb contraction, already described, being the only phenomenon which resulted from stimulation of this convolution.

I saw the patient about five hours after the operation, when he voluntarily moved the affected arm and hand more than I had ever before seen him move them. He was forbidden to attempt any movements until three weeks after the operation. At the end of this time he was tested, when he showed a slight, although distinct gain of power in all the affected parts except his hand and fingers, in which paralysis continued to be almost absolute until September 26th. On that day I applied the faradic current to the affected hand and arm. A few hours afterward he was able to execute slight movements in the fingers. Since Sep-

tember 26th he has had the faradic current applied on alternate days to the face, arm, and hand. Under this treatment he has been making slow but steady improvement. But the improvement in the aphasia and the paresis in the face and leg is most marked. The improvement in the arm, especially in the forearm and hand, is less noticeable. He cannot flex fingers sufficiently to make a fist. He flexes the forearm upon the arm well, but cannot raise the arm to a right angle with the body.

His general health is much improved, and he has been free from headache, vertigo, and vomiting since the operation. Sensation of all kinds remains intact as before the operation.

The second day after the operation, a spasm of the entire right arm occurred, and during the first three weeks following the operation, eight or ten more or less similar attacks occurred. The first five were confined to arm, forearm, and hand; subsequently they became confined to the forearm and hand, and later to the thumb alone. Then an interval of two weeks occurred during which he had only one or two slight twitchings in the fingers. On September 27th, the day following my first electrical treatment, a general convulsion, lasting six or seven minutes, occurred. He was conscious during this attack, as he had been during all his previous convulsions. But few spasms have occurred up to date (February 13, 1893) since this general convulsion.

I am inclined to attribute, in part at least, the great number of spasms which have occurred since the operation to the irritation set up by the operation. Happily, the convulsions are becoming much less frequent; and it may not be too much to hope that they will disappear altogether. Of course, there is the possibility of the cyst refilling. But I think more pressure than formerly would be required to set up the same train of symptoms, as the dura over the aperture will allow for more intra-cranial pressure.

While the result of the operation has fallen considerably short of an entire cure, and is in a measure disappointing, yet it has been followed by distinct and unmistakable benefit to the patient. The man himself feels this and is a good deal encouraged. It is still too early to tell what the ultimate result will be.

Turning now to the lessons in localization of function of the brain taught by this case, there are several points worthy of notice.

The case offers strong evidence in support of the view that the ascending frontal convolution is exclusively related to motor functions. For with an extensive and marked paresis it has been seen that sensation of all kinds, including muscular sense, remained intact in the affected parts.

The cortical representation for the arm, forearm, and hand is located chiefly in the ascending frontal convolution—more so than is indicated in Ferrier's scheme. The cortical subdivisions of the arm area are related to each other as follows in the ascending frontal convolution: That for shoulder is highest; that for elbow, wrist, and fingers are found

below it in the order named. The centre for the thumb is located in the ascending parietal convolution, closely adjacent to, posterior to, and a little below that for the fingers.

The theory that a sub-cortical lesion is apt to produce paresis before convulsions finds confirmation in this case.

Finally, the general principles of localization as enunciated by Horsley, Seguin, Mills, Knapp, Starr, and other localizationists, are well exemplified in this case.

A SUGGESTED IMPROVEMENT IN THE CORRECTION OF LENSES FOR PHOTOMICROGRAPHY, PHOTOGRAPHY, AND PHOTASTROGRAPHY,

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RELIEF, BELLEVUE HOSPITAL, ETC.

PRIOR to the time of the late Col. J. J. Woodward, M.D., Surgeon of the United States Army, say twenty-five years ago, photomicrography was in its first infancy. It is true that photographs of microscopic objects had been made, but they were crude and unsatisfactory, and were all made with what we would call low-power objectives. Although the objectives then made were of excellent construction and well adapted to the revelation of the structure of minute objects to the eye, yet the photographs made with them were greatly inferior in clearness and sharpness to the virtual image appreciated by the retina. The cause of this was not far to seek, and was due to the lack of coincidence of the visual with the so-called actinic focus. At the period mentioned the art of photography was almost exclusively practised with the aid of collodio-iodide plates, which were very sensitive to the blue, violet, and ultra-violet (more refrangible), and but feebly sensitive to the green, yellow, and red (less refrangible) rays. *Per contra*, these latter rays impress the eye so forcibly that the effect of the more refrangible rays is almost obscured—that is, when mingled with the others, as in ordinary white light. The practical outcome of this condition was, that when the ground glass of the camera was in a position that gave the sharpest image to the eye, this image could not be duplicated as to sharpness in the developed photographic plate occupying the plane previously occupied by the ground-glass.

In order to obtain a sharp photographic image it was necessary either to shorten the anterior conjugate focus, which involved the veriest guess-work, and was practically unavailable, or else to move the plate to a

point nearer the lens where the actinic rays came to their posterior conjugate focus. This was perfectly practical, and by repeated experiment the relation of the actinic to the visual focus in a given lens could be ascertained. Although practical, this method was hardly satisfactory.

In ordinary photography, the difficulty attending this difference in the natural positions of the actinic and visual foci had already been overcome by making the visual focus correspond with the actinic by constructing the lens so that it should be left in a state of moderate "under-correction," as it is termed by opticians.

Among the first to appreciate the value of this, as applied to photomicrography, was Colonel Woodward, and the first opticians to give it practical form were, I believe, Mr. William Wales, of New York, and Mr. Ernst Gundlach, then of Berlin, but now for many years a practical optician in this country. This example was followed by Tolles, of Boston; Powell & Leland, of London, and others.

Woodward was one of the most accomplished microscopists, so far as the manipulation of the instrument was concerned, that ever lived. His skill in securing the virtual image and in projecting the real image was at that time equalled by few and probably surpassed by none.

With Woodward's skill and the possession of lenses specially adapted to his purpose, the results obtained by him were the wonder of the scientific world.

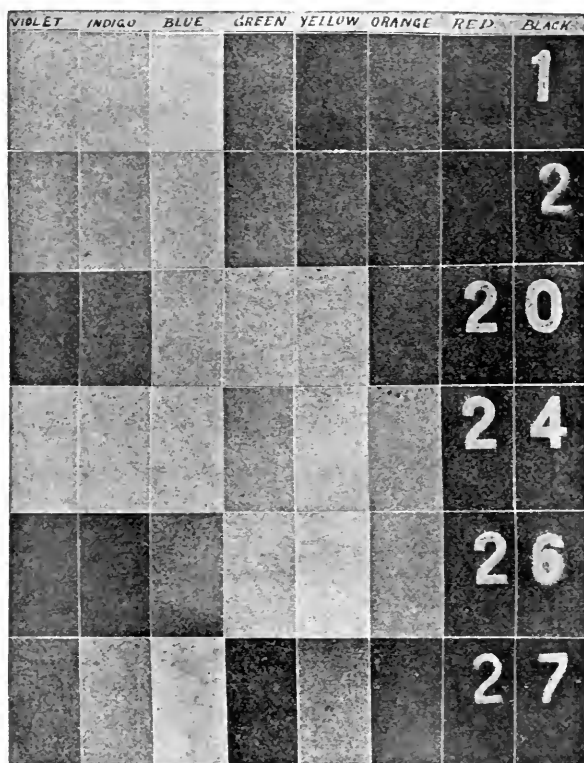
Since his time photomicrography has, in the main, followed the paths he marked out, and the improvements in the art since then have simply kept pace with the gradual improvement of the objective, and especially in the direction of increased apertures. One notable advance in the technique, however, is Abbé's happy conception of the projection ocular.¹

The celluloid-iodide gave place some years ago to the gelatino-bromide plate, which, like its predecessor, is especially sensitive to the blue and more refrangible rays, and almost wholly insensitive to those which give the strongest visual impression. The relative sensitiveness of such a plate to pigment colors is clearly shown in the annexed photograph of an artificial spectrum. (See figure.)

In order to obtain the sharpest image on such a plate the lens must of necessity be under-corrected, as already stated. In accomplishing this, however, there is a certain loss of visual excellence which, however, is of little moment in ordinary photography. That this under-correction of lenses for photomicrography results in an impairment of their visual excellence is well known to opticians, but has thus far received but little notice from the actual users of the lenses in question. A few recent writers, however, have directed attention to the matter.

¹ Peculiar advantages have been claimed in behalf of objectives constructed according to the so-called "apochromatic" system. These lenses, however, possess certain disadvantages which restrain me from giving them unqualified commendation.

Londe (*La Photographie Médicale*, Paris, 1893) says: "The first and most important question is the choice of objectives. These may be excellent for observation and more than mediocre for photography."



Photograph of artificial spectrum.

Mercer (*Journ. Royal Micro. Soc.*, June, 1892), in speaking of some of the objectives used by him in photomicrography, says: "The Wales objectives are corrected spherically for the violet ray. The violet image is, therefore, somewhat superior to the visual, with which, however, it is coincident."

Czapski, in a letter published in Van Heurck's treatise on *The Microscope*, London, 1893, says: "In every case the objectives specially constructed by opticians for photography can never be advantageously employed for observations, and inversely."

From the foregoing it will be clear that lenses which were best for visual purposes were not the best for photographic use, and it was necessary, therefore, when the most perfect results were sought in both depart-

ments, to have a double set of objectives, and many investigators did provide themselves with such an outfit."¹

The inconvenience and lack of economy involved in this arrangement is manifest, but how to obviate it does not appear to have occurred to opticians or others interested in the subject.

Having been practically familiar with photography and photomicrography for upward of twenty years, I have had the opportunity in that period to become reasonably familiar with the inherent defects of their technique, but it was not until the latter part of 1891 that I perceived that a way out of the difficulty might be readily found.

During the past five or six years the manufacturers of gelatino-bromide plates have placed on the market plates which are extremely sensitive to yellow light, and but feebly so to the blue, violet, ultra-violet rays of the spectrum, as will be perceived on examination of the band marked 26 (see figure), and comparing it with band marked 1, of the same figure. (The other bands do not concern the purposes of this paper.)

If now the objective be corrected for yellow instead of for blue or violet light, the negative being made on one of these yellow sensitive or so-called "orthochromatic" plates, there should be an exact correspondence of the visual and chemical foci, and the resulting picture should be superior to one that could be obtained by the ordinary procedures—that is, an under corrected lens and blue-sensitive plate; and at the same time the objective would not have its visual excellence impaired, supposing, of course, that the optician performs his part of the work with care and skill.

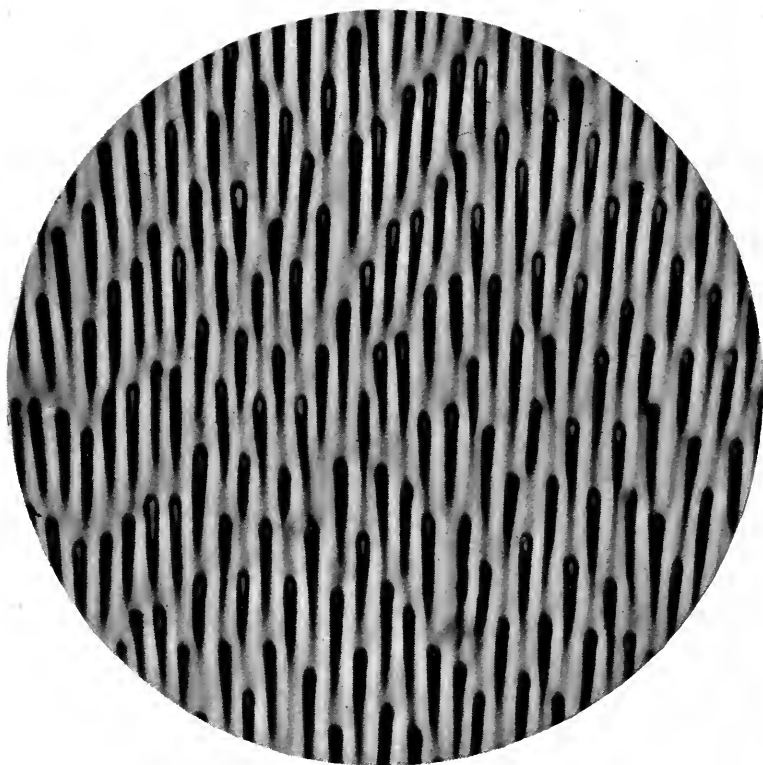
In order to test the practical value of this theoretical reasoning, I requested Mr. H. R. Spencer, now of the Spencer & Smith Optical Co., of Buffalo, N. Y., to calculate the formula and construct a lens which would fulfil the stated requirements. The result was a lens of $1/6''$ equivalent focus, and possessing a numerical aperture of 1.35. With this objective I have resolved and photographed the *Amphipleura pellucida* in lines, and have photographed both the *Navicula rhomboides* and the *Van Heurckia crassinervis* in lines and beads.²

In ordinary histological work, with amplification ranging from 200 to 400 diameters, the results with this lens have been very much more satisfactory than I have been able to obtain by any other combination of lenses or plates.

¹ It must be admitted that some of the apochromatics of short focus (2 mm.) obviate, in a measure, this difficulty, but those of longer focus have not, at least in my hands, proved satisfactory.

² As regards the last-named object, it has been previously photographed in beads, so far as I am aware, only by Van Heurck with the aid of a lens of higher power $1/8''$ and much larger aperture (S. A. 1.60).

26^a



Photomicrograph of the TEST PODURA (*LEPIDOCYRTIS CURVICOLLIS*). $\times 3000$.
By HENRY G. PIFFARD, M.D.

Spencer & Smith obj. 1/15. N. A. 1.35.

To face page 27.]

With a 1/4" objective of the same construction, made by Spencer & Smith on the order of Dr. J. A. Fordyce, of this city, I have resolved the *A. pellucida* with white light, and have demonstrated the resolution to him and to others. With a 1/15" of the same construction, the property of Dr. J. H. Kellogg, of Battle Creek, Mich., I made the photograph of the podura which accompanies this paper. (See Plate.)

In order to further test the correctness of the principles involved, I requested Mr. Turner, of the Gundlach Optical Co., Rochester, N. Y., to make a 3/4" lens of moderate aperture (N. A. 0.33.) Considering the power, aperture, and price (\$12), the lens gave very satisfactory results, and wholly confirmatory of the theoretical demand.

In using these lenses with yellow sensitive plates there is a distinct gain in definition and purity of image, both visual and photographic, if the object be illuminated with light of corresponding refrangibility (λ 5892). This may be obtained absolutely by employing a sodium-flame, or approximately by intercepting the white light with a medium capable of absorbing the rays of short wave-length.

For the greater part of photomicrographic work, and especially that which deals with histology, I unhesitatingly recommend the technique here described, which, briefly stated, consists in the use of objectives whose corrections shall be adjusted to the D instead of the G or H lines, and in connection with plates specially sensitive to D light, and having the object illuminated as near as may be with rays of the same refrangibility.

If, however, we have to deal with objects in which we must resolve or optically separate particles whose approximation to each other is less than, say, $\frac{1}{100000}$ of an inch, the foregoing statements do not apply.

The studies of Helmholtz and of Abbé have placed us in possession of a formula which appears to be theoretically and practically true, and may be expressed as follows:

$$R. - p. = \frac{n. \times \sin. u.}{\lambda}$$

"R. - p." here indicates the resolving power of the objective; "n." the refractive index of the medium lying between the cover-glass of the object and the front lens of the objective (be the same air, water, glycerin, or oil); "u." the semi-angle of the aperture of the objective; sin. the natural sine of said semi-angle; and " λ " the wave-length of the light employed. Now the "numerical aperture" of the lens is equal to $n. \times \sin. u.$, and the equation becomes simplified into

$$R. - p. = \frac{N. A.}{\lambda}$$

From this it will be seen that if we desire to obtain extreme resolution, it is necessary to employ objectives of the greatest numerical aperture, and employ in connection therewith such visible rays as possess the shortest wave-lengths. For the photographic reproductions of such images blue-violet sensitive plates, with under-corrected lenses and approximately blue or violet illumination (Woodward's technique) will give the best results. At the present time Mr. E. M. Nelson, of London, is devoting special attention to the development of this branch of photomicrography.

It will be noted that the formula above given does not take into account the equivalent focus or magnifying power of the lens; in other words, that this factor has no influence on the resolving power of the objective. This is correct. A well connected 1" objective will resolve exactly as well as an equally good $1/4''$, provided the factors $N. A.$ and λ remain the same. I here allude to this matter, as every few years someone imagines that he is on the verge of great discoveries to be brought about by the simple feat of increasing the amplification of the image. Let us assume that a photograph be made with an amplification of 3000 diameters, with $N. A.$ the greatest and λ the least possible. This photograph may then be further enlarged to 30,000 or 300,000, but the enlarged pictures will not show any finer or more intimate structure than was delineated on the original smaller picture.¹

Although orthochromatic or isochromatic plates have been regular articles of commerce for several years, they are used by practical photographers to a limited extent only. This is due to the fact that, despite the acknowledged superiority of the plates themselves, the negatives made on them with the lenses ordinarily at command have not yielded as satisfactory results in some respects as were obtained on the older blue-sensitive plates. The reason of this is almost self-evident. All ordinary photographic lenses at present constructed are under-corrected, and intentionally so, in order to make the visual image agree with that

¹ Some months ago a friend, who is a sub-chief in one of the principal bacteriological laboratories of this city, remarked to the writer that the height of his ambition was to possess and work with a Zeiss $1/18''$ apochromatic. I replied that if he fancied Zeiss lenses he had better select a $1/12''$, as with it he would be able to do more and better work in the line of research and discovery than with the $1/18''$. My reply was evidently received with extreme incredulity. If we refer to Zeiss' catalogue, we shall find that the numerical aperture of the $1/18''$ is given as 1.18, but the $1/12''$ of the same matter has a $N. A.$ of 1.30. He makes still another $1/12''$ $N. A.$ 1.40. Applying these figures to the equation above given, and assuming for white light λ 5269, we shall find that the $1/18''$ will resolve or differentiate particles that approach each other as closely as about 114,000 to the inch, while the $1/12''$ of $N. A.$ 1.30 will resolve particles as close as about 125,000 to the inch, and the $1/12''$, $N. A.$ 1.40, will take optical cognizance of lines or particles that approximate each other to within about $\frac{1}{135000}$ of an inch.

formed by the shorter wave-lengths to which alone the old-style plates are sensitive.

If for any reason the photographer desires to use orthochromatic plates, either for copying, for portraiture, or in general landscape work, the only rational procedure is to use lenses that are specially corrected for them. To carry out this idea the Gundlach Optical Co. kindly constructed an $8 \times 10''$ "rapid rectigraph" lens of 13" equivalent focus corrected for the D instead of the G line of the spectrum. The performance of the lens has fully justified the induction that led to its construction.

When orthochromatic plates first came into general use, the astronomers seized on them with avidity; but it was not long before they became dissatisfied with the results. At a recent astronomical congress in France the sentiment of the majority of those present was that more faithful and satisfactory images of the heavenly bodies were obtained on the blue than on the yellow sensitive plates.

Little of value had been done in photastrography until the late Mr. Lewis Rutherford, of New York, produced some photographs of the moon which greatly surpassed any of the sort that had been previously accomplished with the refracting telescope.¹ Rutherford used a telescope with the objective so extremely under-corrected that it was almost useless for visual purposes. This lens, it is almost needless to say, was specially corrected for the shorter wave-lengths, to be used in connection with wet collodion blue-sensitive plates, the only ones at that time available. Some astronomers employ a telescope corrected for best visual definition and a duplicate specially corrected for photography, and it is the latter that they have usually employed with the orthochromatic plates. The reason, then, that these plates have fallen into disfavor with many of them is due to the fact that they have used the wrong lenses with the right plates.

One of the principal advantages connected with yellow-sensitive plates is their ability to record the details of distant objects in a more satisfactory manner than is possible with the ordinary ones. Some four years ago the writer called attention (*Anthony's Photo. Bull.*, February 9, 1889) to the *graphotelic* properties of these plates in connection with landscape photography. If this special attribute of yellow-sensitive plates is of value in connection with distances limited by, perhaps, a score of miles, it certainly seems that it should not be overlooked by those who work their lenses with the anterior conjugate focus many millions of times greater than the posterior.

¹ I am not unmindful of the magnificent work done by Dr. Henry Draper with his reflecting telescope.

CASES OF BONE IMPLANTATION AND TRANSPLANTATION FOR CYST OF TIBIA, OSTEOMYELITIC CAVITIES, AND UNUNITED FRACTURE.¹

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VARIOUS methods have been suggested for dealing with cavities or losses of substance in bones, whether caused by disease, by accident, or by operation. Omitting such plans of treatment as sliding forward flaps of bone left in contact with the soft parts, turning in the surrounding skin, and skin-grafting, there are left for consideration those methods which seek to fill the gap by placing in it some solid material, either living or dead, and also Schede's blood-clot healing. The solid materials used for this purpose may be classified as follows:

1. Foreign substances ;
 - a. Non-absorbable, such as various metals, celluloid, plaster-of-Paris (Dreesman¹).
 - b. Absorbable, such as catgut, Halstead's "fibre," sponge, decalcified bone, simple dead bone, ivory.
2. Living bone ;
 - a. From another species.
 - b. From the same species or the same individual.

These various materials have all been made to heal-in in bone cavities, the only difference being that ultimate success is most difficult to obtain with the least absorbable. The principal questions remaining for discussion are as to the final results, the ultimate fate of the implanted material, the general applicability of the methods, and the choice of the best method to suit an individual case.

The non-absorbable materials all have the common fault that they remain continuously unchanged as foreign bodies encapsulated in the tissues, being a constant source of danger—for at any time some slight injury may disturb the balance which exists between them and the surrounding parts, and result in their final extrusion.

The absorbable substances are inserted with the idea of giving temporary support, of providing a sort of scaffolding for the new tissue to grow in, or perhaps merely to provide a temporary filling of the cavity which will allow superficial union to take place, so that the patient will be free from an external wound while the true healing is going on below. The substances in use vary all the way from catgut to ivory, for it has been proven by experiment that ordinary dead bone and

¹ Read before the Surgical Section of the New York Academy of Medicine, March 13, 1893.

² Beiträge z. klin. Chirurgie, 1892, ix. 804.

ivory are slowly attacked, eroded, and absorbed by the living bone cells around them, although in the case of ivory this process is an exceedingly slow one. Catgut is so absorbable that it is very little better than blood-clot for this purpose. Halstead's "fibre" is difficult to prepare, and decalcified sponge is not always absorbed, hence, Senn's decalcified bone appears for the present the most practical material for use in the ordinary cases, while we are awaiting the ideal of the future—the insertion of a piece of living bone which will exactly fill the gap and will continue to live without absorption. It is true that the method of healing with the moist blood-clot gives good results, and that bone rapidly develops in cavities thus filled, but the use of decalcified bone is not so severe a test of the asepsis of the operative technique and of the cavity to be filled, for blood-clot is the best possible medium for the development of germs, whether introduced by the surgeon's fingers or left in the surrounding tissues after the removal of the products of inflammation, while the decalcified bone can not only be made thoroughly germ-free, but can be so impregnated with iodoform as to resist germ-growth. The Haversian canals, moreover, afford easy avenues for the growth of granulation tissue, and in some cases it has been observed that the bone turns of a rosy hue within a short time after implantation, apparently by imbibition of blood, two facts which probably explain why ossification so soon takes place in the tissues which replace the decalcified bone as it is absorbed. Simple dead bone and ivory have the disadvantage of too slow absorption, for as long as they are unabsorbed they are exposed to the same risks of extrusion as the metal and other inorganic foreign bodies.

Three successful cases of decalcified bone implantation, all done by me over a year ago, will give some idea of the immediate and final results to be hoped for from the method, and they also present some other interesting features in bone surgery.

CASE I. *Cyst of tibia; secondary implantation of decalcified bone; recovery.*—M. E. A., male, eighteen years of age, single, born in the United States. When a child he is said to have broken the right leg. At the age of twelve years he had an attack of pneumonia, and immediately after began to have pains in the head of the right tibia, coming on between sunset and sunrise. At first the attacks were occasional, later they became more frequent and severe, and finally for a year he was bedridden. He was treated by many physicians who supposed he had rheumatism. About six months before entering St. Luke's Hospital, a swelling appeared over the seat of the pain, but this disappeared slowly and spontaneously. He was admitted in October, 1891, to the service of Dr. L. Bolton Bangs, to whom I am indebted for the opportunity for making the bone implantation and of reporting the case. There was no sign of swelling or redness, and no febrile or other constitutional disturbance, but the diagnosis of bone abscess was made. Under anaesthesia an incision was made upon the affected bone, and the periosteum

was not found to be thickened in the least. With a few strokes of the chisel, the thin roof of a cavity in the bone was pierced, just below the tuberosity of the tibia. The cavity was of the shape and size of a small hen's egg, with smooth walls, lined with a thin layer of granulation tissue, and containing a clear serum. The greater part of the anterior wall of the cavity was cut away, and the bone seen in this section and under the granulation-tissue lining when removed by the curette, appeared perfectly healthy, without a sign of cartilage or other new growth, but was rather denser than usual. The cavity was packed with gauze. The serum removed coagulated completely in a test-tube on boiling. Microscopic examination of the lining tissue, made by Dr. John S. Thacher, pathologist to the hospital, proved it to be simple granulation tissue. There was no trace of echinococci in the serum.

November 5, 1891, Dr. Bangs allowed me to fill this cavity with decalcified bone chips. It was granulating and in a perfectly aseptic condition, and ether having been administered, the granulations were removed with the curette, decalcified bone chips sprinkled with iodoform were packed in tightly, and the skin united over them without drainage. Primary union was obtained with the exception of a small sinus. On December 24th the patient was discharged. (Patient exhibited.) He tells me that the sinus remained open until March, 1892, discharging little serum but never any solid particles, and then it healed spontaneously. His health has been excellent ever since, and he walks freely without pain. The scar is smooth and not adherent to the bone, and the surface of the bone beneath it is flat, smooth, and perfectly hard.

I know of only two cases on record like the present, for the great majority of bone cysts give clear evidence of having originated from degeneration of solid tumors, according to Virchow's hypothesis. These two are the cases of Sonnenburg (*Deut. Zeitschr. f. Chir.*, 1879, xii. p. 314) and Schlangé (*Arch. f. klin. Chir.*, 1887, xxxvi. p. 117), and it is worthy of note that both were of traumatic origin, occurred in young individuals (twelve and fourteen years of age), and remained free from recurrence when seen months later. In the first case, Von Recklinghausen examined fragments of the walls of the cavity microscopically, and found no indication of neoplasm. Schlangé suggests that these cysts originate in a mild osteomyelitis, not severe enough to result in the production of pus, similar to the serous abscesses found elsewhere and lately studied by Nicaise (*Rev. de Chirurgie*, June, 1892, p. 512).

CASE II. *Osteomyelitic abscess of humerus; evacuation; secondary implantation of bone, with suture of injured musculo spiral nerve; complete recovery.*—F. F., thirteen years of age, born in New York City, school-boy, good personal and family history. Referred to me by Dr. John Ridlon, October 14, 1891. Eight weeks before he was seen by me he was struck upon the left shoulder, over the scapula, by a large stone. The contusion was recovered from under treatment, and he had no further trouble until two weeks ago, when, without any cause, he was seized with great pain in the left humerus, much increased by any attempt at motion. The pain grew worse for a week, and at the

end of that time his health began to fail from loss of appetite and sleep. He has had attacks of sweating at night, but no chill. His temperature at present (morning—taken in the mouth) is only 99° . The boy appears to be in great pain, the left arm hanging powerless from the shoulder, as if paralyzed, and he is unable to sit still, trying constantly to ease the left arm by changing its position, generally by moving it with the other hand. There is no trace now of the injury to the shoulder. Passive motion in the shoulder and elbow joints is good on careful handling. The entire shaft of the humerus is tender to pressure, apparently most tender at the condyles, and pressure in its long axis is also painful. There is no swelling anywhere, and no hyperæsthesia or reddening of the skin. Rest, wet dressings, and morphine during the following two days were without effect, the pain increasing constantly; and although no special point of attack could be selected, interference became absolutely necessary, and he was admitted to my service at St. Luke's Hospital October 17, 1891. His afternoon temperature had heretofore been unknown, but just before operation it was found to be 104° .

Operation. Ether anæsthesia. The inner side of the arm appearing to be the most tender, an incision was made at that point down to the bone, but no trace of inflammation was found anywhere, not even in the periosteum or on the surface of the bone, and the incision was closed with sutures. An incision was then made upon the outer side of the arm, and still no sign of inflammation was found. The medullary cavity was then opened just above the middle of the shaft with the chisel, and it was found to be filled with thin creamy pus. This abscess cavity extended from below the middle of the shaft up to and penetrating the head of the bone, and after irrigation its outer wall was cut away for nearly its entire length and the wound packed. In enlarging the wound downward the musculo-spiral nerve was exposed, and one of its branches inadvertently wounded with the knife. Subsequent events proved that the entire nerve was divided, but how this occurred remains unknown—possibly it was torn across with the retractors. On account of the pus infecting the wound no attempt was made to suture the nerve at the time, especially as I expected to be able to implant the cavity with bone before many days. Primary union of the inner wound was obtained, and the condition of the outer one remained excellent, but some layers and spicules of necrosed bone kept forming on the walls of the cavity, and the patient was allowed to go home November 20th, with a granulating cavity and complete musculo-spiral paralysis. After some delay he finally entered the hospital again, and on February 22, 1892, the cavity in the bone was thoroughly exposed, curetted, and filled with the decalcified bone chips and iodoform. At the same time the musculo-spiral nerve was dissected out at the lower angle of the wound, and its separated ends freshened. The gap between its ends then amounted to nearly an inch, but by thorough stretching the ends were brought into contact and sutured with very fine catgut, the sutures passing through the entire thickness of the nerve.

Primary union was obtained throughout the wound, and the boy was discharged, to return for electrical treatment. He came back, however, only a few times, and for some months there was no improvement in the function of the paralyzed muscles, but power over them was first obvious during the following July, and when I saw him in August, six months after the operation, he could extend the fingers about half-way, the

thumb not so well. He now (patient exhibited) has such full power that it is impossible to tell without careful examination which was the injured arm. He tells me that during the summer a small "pimple" formed in the upper part of the scar and remained open for some time, but that has now closed entirely, although it has left a depression, probably showing where one chip of decalcified bone broke down. Otherwise the scar is non-adherent to the bone, and the latter is smooth, flat, and hard on its surface.

CASE III. *Osteomyelitis of os calcis; évidement; secondary implantation; recovery.*—S. T., thirteen years of age, school-boy, born in New York, admitted to St. Luke's Hospital in September, 1891. He had an osteomyelitis of the left os calcis, originating in a sprain received two months before, beginning with the usual signs of inflammation, and treated by incision. On admission, sinuses leading down into the body of the bone were found on both sides of the heel. On September 22d évidement was performed by two incisions, thoroughly exposing the bone, and almost the entire os calcis was found broken down and removed by the curette, leaving only a periosteal cavity and the articular cartilaginous surfaces. November 5, 1891, the cavity was granulating healthily, but had not grown much smaller, and its walls were slightly thickened with new bone formed from the periosteum. Ether was administered, the granulations were scraped out, the cavity tightly packed with decalcified bone chips and iodoform, and both incisions closely sutured. Primary union was obtained; no sinus formed; the boy went home just before Christmas, and began to use the foot about the end of the following month, January. Under date of March 6, 1893, he writes that the heel is a little "short," and that it occasionally aches when he uses it too much, but that he considers it as sound as ever. When not at school he does ordinary farm-work.

These three cases are the only ones which have come under my care and have appeared suitable for this method, and every one was successful, in spite of the considerable size of the cavities involved. I have had no experience with the method advocated by Kümmell (*Deutsche med. Wochenschr.*, 1891, xvii. 389) and LeDentu (Buscarlet: *Gaz. des Hôpitaux*, 1891, lxiv. 1361), of inserting large pieces of decalcified bone, filling the entire gap with one piece cut to fit it; but it appears to me that additional risk of failure is encountered in attempting to heal in such large pieces—in case of partial infection, for instance, the entire piece of bone would have to be removed, instead of having it quietly discharge itself through a small opening without affecting the general result.

In all of the methods hitherto considered we have been studying implantation of bone, for the term transplantation must be limited to the use of living bone. There is good experimental evidence,¹ as well as clinical experience,² to show that living bone will continue to live

¹ McGregor: *Journ. Anat. and Physiol.*, London, 1891, xxvi. p. 220; contradicted by Schmitt, *Arch. f. klin. Chirurgie*, 1893, xlv. 401.

² Sherman: *Pacific Med. Journ.*, June, 1889. McGraw: *Internat. Med. Magazine*, 1892, i. 572. Poncet: *Lyon Médicale*, 1886, No. 39. Buchanan: *Med. and Surg. Reporter*, 1892, lxvii. 526. McGill: *Lancet*, October, 1889. Forgue: *Congr. franç. de Chirurgie*, Trans., 1891, v. 617.

when transplanted from one part of the body to another, from one individual to another, and even from one species to another. It has also been proven that its life does not depend solely upon the periosteum, but upon the cells of the bone tissue themselves, so that even without any periosteum such a detached piece of bone will retain its vitality, enter into union with surrounding bone or periosteum, and not become absorbed, as is dead bone under similar circumstances. Such fragments should be small, and the smaller they are the more likely they will be to retain their vitality. This probably explains Kümmell's case, in which he transplanted a piece of the ulna into a gap in the radius of the same arm, caused by an ununited fracture, due to necrosis, and the piece became completely absorbed, while a single large piece of decalcified bone implanted at the same time into the gap he had made in the ulna was replaced by full osseous reproduction. Probably, however, the fact that the ulna was perfectly healthy while the bone of the radius was in an abnormal condition, as shown by the failure of bone production and occurrence of non-union of the original fracture, had something to do with this result.

About a year ago I succeeded in healing a gap in the tibia by bone transplantation. The history is briefly as follows:

CASE IV. *Transplantation of bone from fibula to tibia for ununited fracture.*—B. R., thirty-three years of age, single, born in northern New York, with a healthy personal and family history, was working at a planing machine, January 5, 1891, when his trousers caught in the belt which drove the machine, twisting his left leg and jamming it against the pulley over which the belt ran. He caught hold of the machine and did not fall, but received a compound fracture of the inferior third of the left tibia, the upper fragment projecting three inches through the skin; a simple fracture of the fibula, a simple transverse fracture of the left femur of the same limb at its middle, and possibly also one nearer the knee. The deformity of the tibia was reduced and splints applied; but this deformity recurred twice during treatment, requiring reduction, and finally resulted in necrosis, and the removal of a sequestrum over two inches in length, comprising apparently the entire thickness of the shaft of the tibia at the site of injury. Soon after this, while going about on crutches, three months after the original injury, he fell and broke his left femur again.

In June of that year he was admitted into St. Luke's Hospital—examination showing a deficiency in the shaft of the left tibia about two inches in length, with no attempt at the production of new bone. The lower half of the left femur was thickened and had a slight outward curve. There was marked fulness in the neighborhood of the left knee, and flexion was limited to 15° , apparently by bony contact. There was no fluid in the knee-joint. On the right side the distance from the anterior superior spine of the ilium to the internal malleolus measured $35\frac{1}{2}$ inches; on the left side the same measurement was only $33\frac{3}{4}$. The left leg, however, measured fifteen inches from the knee to the ankle, while the right was only one-quarter of an inch longer, so that the

shortening was due almost entirely to the deformity in the femur. The patient was in good health in every way.

Operation, June 4th. Ether anæsthesia. An incision was made over the seat of fracture in the tibia, where the skin was marked with numerous scars, and showed that the ends of the fragments were tapering, and that the points lay in such a position that there was an oblique gap between them wide enough to easily contain the finger if laid in it, running from above downward and from without inward. To refresh and overlap these fragments, as would be necessary for secure wiring, would shorten the leg about two inches, and make the total shortening of the limb amount to four inches, consequently it was determined to attempt to fill the gap with a piece of bone from the fibula, and an incision was accordingly made over that bone at the same level. It was intended to divide the fibula squarely across, cutting out a fragment about an inch long, to be left in connection with its periosteum and the other soft parts as far as possible, and to push this fragment through an opening made between the muscles of the leg into the gap in the broken tibia. But the fibula had also been fractured obliquely just at this point, and the union was so weak that it gave way under the blows of the chisel employed to divide the bone, so that the best that could be done was to secure the desired length of bone in several fragments, some of which, perhaps, remained attached to the periosteum, but the greater part undoubtedly entirely isolated. The pieces were, however, not exposed to the air, but pushed through the opening made between the muscles and inserted in the oblique gap in the tibia, irrespective of whether compact or cancellous structure lay in contact with the freshened ends of the tibial fragments. The wounds were then closed by sutures—that over the tibia with great difficulty on account of the thickening and adhesion of the skin to the bone. The limb was put in plaster-of-Paris, the ends of the fragments being pressed somewhat together, shortening the leg a trifle.

Primary union was obtained, the temperature never rising above 100°, and the first dressing was made thirty-two days after the operation. A small sinus was found in the tibial wound. The bones were in good position and there was already some union. The sinus healed, and on August 13th union is noted as “fair.” One month later, three months after the operation, as some motion (bending of the bone at the seat of fracture) was still present, a Thomas knee-splint was applied, so that the patient could walk about and bring some pressure to bear on the weak point at the same time that a stout leather legging held the bone stiff in the splint. Measurement made at that time showed the total shortening of the limb to amount to less than two inches. Not long after, signs of periosteal inflammation appeared and the old sinus reopened; therefore, on September 27th, this was explored under anæsthesia, an incision three inches long being made along the front of the tibia, the periosteum detached from its internal and posterior surface, where some granulation tissue was found and curetted away, but no necrotic or carious bone was detected. It was impossible to tell from inspection of the seat of fracture whether the transplanted pieces had lived or had been absorbed and replaced by new bone. Union was perfect and so solid that strong effort failed to bend the bone. November 19th, the wound, which had been treated by packing, had contracted to a narrow sinus, and the patient was discharged, wearing a high shoe and walking with a cane. Several months later he wrote to me that

this sinus still remained open and that he was packing it vigorously. I directed him to stop the packing, and on November 8, 1892, he reported that the sinus had closed spontaneously during the summer, and that he had been acting as a guide in the Adirondacks, carrying his boat as much as five miles at a stretch, being troubled only with a corn, which was due to the poor fit of his high shoe.

Before closing, it may be well to give a brief account of the technique employed in these operations, which was the ordinary aseptic technique in use at the hospital. The neighborhood of the wound was thoroughly cleansed and kept in a soft-soap poultice, followed by a 1 : 3000 bichloride dressing for twelve hours. The operators' hands were washed in soap and water, followed by a 1 : 1000 bichloride solution for three minutes by the clock. Instruments were boiled in 1 per cent. sodium carbonate solution for half an hour. Gauze, sterilized by steam heat, was employed for dressings, and instead of sponges, a narrow strip of rubber tissue was laid next to the wound, after having been washed and sterilized in a 1 : 1000 bichloride solution. Catgut for sutures and ligatures was sterilized by boiling in absolute alcohol for one hour. The decalcified bone was prepared according to Senn's directions, being decalcified in a 50 per cent. solution of hydrochloric acid for ten or fourteen days. The bone was taken from the compact substance of the beef-bone, cut into cubical pieces averaging about one-third of an inch in thickness. They were washed in weak alkaline solution after decalcification, and preserved in absolute alcohol. Just before use they were cut into small chips and sprinkled liberally with iodoform (not especially sterilized) as they were packed into the wound. Although we observed no symptoms of iodoform poisoning, caution is necessary in employing this drug, for Deaver¹ had a case of poisoning from its too free use for this purpose.

THE TREATMENT OF CHOLERA BY HYPODERMOCLYSIS AND ENTEROCLYSIS.²

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It is convenient in discussing this question, to divide the treatment according to the stage of the disease, and we shall therefore speak of—

1. The premonitory stage.
2. The evacuant, or stage collapse of, and
3. The stage of reaction.

¹ The Medical News, 1889, iv. 714.

² Read before the American Climatological Association at its meeting in Philadelphia, May 26, 1893.

In the way of prophylaxis but little need be said, as all are in accord with the statement that cholera is communicated from the sick to the well directly, and that the poison is usually swallowed. All, therefore, that is necessary in the way of prophylaxis is to prevent the swallowing of the cholera poison. This is best accomplished by avoiding ordinary water, and resorting to the exclusive use of distilled water, or carbonated water, or Apollinaris or other table waters of like character, and also by avoiding such foods as may be the carriers of the poison, more particularly partially cooked or uncooked vegetables, as well as fruits, salads, etc. When it is impossible to resort to distilled water, or to bottled waters, ordinary water may be boiled, and then used so soon as possible thereafter. Fruits and salads may have come in contact with the cholera germs, and, as they cannot be thoroughly cleansed, it would be wiser to omit their use. All foods should be thoroughly cooked, as the comma bacillus is destroyed at a temperature of 212° F. In times of epidemics the most scrupulous care should be taken regarding personal cleanliness; the hands should be thoroughly scrubbed with hot water, and, if there is reason for believing that one has actually been in contact with the disease, the hands should be sterilized by dipping them in a 1 : 500 solution of bichloride of mercury. Great care should be taken to avoid attacks of indigestion, and all foods taken should be nourishing and of easy digestibility.

1. PREMONITORY STAGE.—The indications for the treatment of this stage, the diagnosis of which is difficult and often impossible without a biological examination of the gastric or intestinal discharges, are best met by placing the patient at rest in bed, and making sure that he is well protected from cold. His food should be of the simplest character, and preferably restricted to boiled milk, well-boiled rice, and milk-toast, which should be given in rather small quantities at intervals of two hours. As the digestion, both gastric and intestinal, is usually performed with difficulty, the administration of five grains of pepsin with the food would be of benefit. Insomuch as the cholera poison cannot grow in acid media, and as acids tend to destroy the cholera bacillus, the administration of an acid is strongly indicated. As hydrochloric acid is the natural acid of the gastric juice, and as it promotes thorough digestion, it is preferable to all others that have been suggested, though doubtless they are all valuable. I would suggest for an adult, thirty to forty drops in a tumbler of water; for an adolescent, from twenty to thirty drops, and for a child, ten drops every two or four hours. Tannic acid has been suggested by Cantani, of Naples, but I believe all vegetable acids are inferior to hydrochloric acid. Dr. Roland G. Curtin,¹ some years ago, obtained very valuable results in the prevention and treatment of

¹ "Hydrochloric Acid as a Prophylactic in Cholera," Philadelphia Medical Times, July 12, 1873.

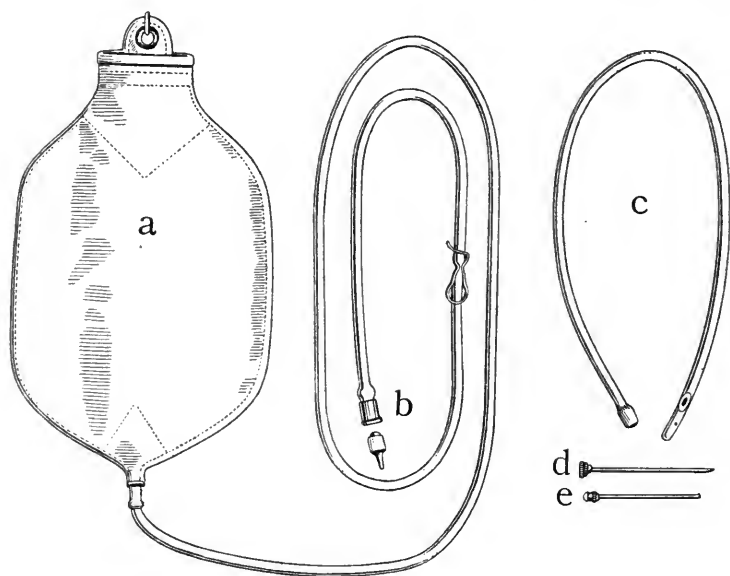
cholera by the use of aromatic sulphuric acid, in doses of twenty drops in four ounces of water, and succeeded in preventing the development of cholera in a large number of cases by its use during the epidemic of cholera in 1866 and 1867, while resident physician in the Insane Department of the Philadelphia Hospital.

In many cases it is impossible to recognize the premonitory stage, and perhaps in a majority of cases the physician has not the opportunity of seeing the patient until the stage of collapse has developed. I have observed several cases of Asiatic cholera in which this stage was absent, and in virulent cases quite uniformly the premonitory diarrhoea was slight, and often escaped observation.

2. THE EVACUANT, OR COLLAPSE STAGE.—In this stage much can be done. The indications for treatment are unusually clear, and the methods of meeting these indications are very plain. In consequence of the enormous discharge of liquids from the stomach and bowels the entire organism is shrivelled and shrunken, and the blood loses a large portion of its watery element. As a result of this serous drain the red blood-corpuscles cannot circulate freely, and are therefore unable to pass to the lungs to take up their normal quantity of oxygen, or to throw off carbonic acid. This condition produces cyanosis, which shows itself quickly, and is more especially noted in the extremities and about the nose and lips.

Furthermore, in consequence of the great loss of liquids, the muscles get into a tonic spasm, they become hard and board-like in character, twisting and distorting the superior and inferior extremities, and exciting intense pain. To meet this indication it becomes necessary to administer liquids, but, unfortunately, vomiting and diarrhoea are constant, and attempts to administer liquids are usually followed by their prompt rejection. Attempts to administer liquids directly into the veins have been made, but in cholera all the veins are collapsed and are discovered with difficulty, and in many cases it is impossible to secure a vein of sufficient size for this purpose without proceeding to a formal operation for the exposing of those more deeply situated. This is particularly the case in children, and in this stage of cholera one does not feel justified in adding unnecessarily to the suffering of the patient. Moreover, this method of meeting this indication has not fulfilled the brilliant results that were confidently expected, and has now been abandoned. The most natural and simple method of supplying this want of the system for liquids is by the subcutaneous injection of a solution of $\frac{6}{10}$ per cent. (or two small teaspoonfuls) of sodium chloride in a quart of hot water (distilled and sterilized), to which two ounces of brandy may be added. The operation of hypodermoclysis was first employed by Cantani, at Naples, during the epidemic in 1865, and was again used by him with great success in 1885. The operation is one of great simplicity, requiring for this purpose a small-sized aspirating-

needle (*d*) and canula (*e*), which is attached to the rubber tube of an ordinary fountain syringe (*a*). The best point for the introduction of the needle is in either flank, between the ribs and the crest of the ilium; the inner surface of the thighs may also be used. Observation has shown that there is danger in the injection of liquids beneath the skin of the neck, as two cases of fatal oedema of the larynx following such injections have been reported. The operation should be performed in accordance with the well-known rules of antiseptis. The entire apparatus should be sterilized, and the skin that is about to be punctured should be first washed in soap and water, then alcohol, then ether, and afterward well saturated with a 1 : 500 solution of bichloride of mercury. A fold of the skin should then be grasped between the thumb and forefinger and elevated, and the needle introduced through the skin into the



subcutaneous space. When this operation is performed under these circumstances no unpleasant effects have been observed. In a large number of cases thus treated at the Swinburne Island Cholera Hospital, but one abscess developed, which was distinctly traceable to an infraction of the rules here advised. The first injection in an adult should be one or two quarts; for an adolescent one or two pints, and for an infant one-half pint. The solution should have a temperature in the reservoir of 110° F., which will be reduced to 105° F. after traversing the long tube to the subcutaneous space. The liquid should be slowly introduced by hydrostatic pressure, which may be regulated to a nicety by raising or lowering the reservoir. It requires twenty to thirty minutes to intro-

duce one quart of liquid, and ordinarily it is unnecessary to disperse the liquid by massage, though this should be advised in grave cases where rapid absorption is imperative. As it is natural to suppose, this subcutaneous liquid forms a large oval swelling, the size depending upon the amount introduced. In favorable cases absorption takes place in from twenty to forty-five minutes, but in some cases four hours are required. It therefore becomes evident that the rate of absorption is of great prognostic importance. If all the tissues are dried, and absorption takes place slowly, it is an evidence that the lymphatic, as well as the hæmic, circulation is at a low ebb, and that death is imminent. Occasionally when the operation is repeated frequently, the patient may complain of sensitiveness and pain, aggravated by light pressure over the region of the punctures, but this disappears within forty-eight hours. If, at the end of the first introduction, it is deemed desirable to introduce more liquid, a second puncture may be made in the other flank at a corresponding point on the opposite side, and injections may be made every two hours or less frequently, depending upon the condition of the patient.

The second great indication for treatment is to counteract the pathological process which may be going on in the intestinal mucous membrane—for, as is well known, the comma bacillus attacks the superficial layers of this membrane, and local treatment in this disease is, therefore, a most rational procedure. The bacillus of cholera has not been found in the blood nor in the viscera, and the supposition is that it generates an alkaloidal poison, which, by its absorption, produces many of the symptoms of the disease.

Recognizing the difficulty of introducing any substances by the mouth in view of the frequent acts of vomiting that occur, and from the fact that, when vomiting is not present, it is usually excited so soon as attempts are made to introduce *any* substances, it is clear that we must abandon in most cases all hope of medicating the intestinal mucous membrane by the oral administration of drugs, though in cases where the stomach is retentive this may be attempted, and, under these circumstances, one would naturally expect good results from one of the intestinal disinfectants, more particularly a substance like salol, or the salicylate of sodium. Personally, I have had no experience in the use of remedies by the mouth in this stage of cholera, as in the cases under my observation the stomach was non-retentive.

Our efforts failing in this direction, one's attention is naturally directed toward a remedial agent that may be introduced through the rectum. Here, again, we are met with an obstacle in the anatomy of the ileo-cæcal valve, which hinders the passage of liquids from the colon into the ileum. Prior to September, 1892, I was strong in the belief that the ileo-cæcal valve prevented absolutely the regurgitation of liquids from the colon into the ileum, and this has been the teaching of most

of our well-known anatomists. Recognizing the importance of solving this question, the following experiments were made:

A fountain syringe containing three pints of water was suspended at an elevation of five feet, and a rectal tube introduced for a distance of six to seven inches.

CASE I.—Male child, aged two years; dead of cholera; the liquid passed readily, filling the intestines and stomach.

CASE II.—Male child, aged two years; dead of marasmus; liquid passed freely, filling the intestines and stomach.

CASE III.—Child, aged six years; dead of measles; the liquid passed readily through the entire intestinal tract, and flowed from the mouth and nose.

CASE IV.—Child, aged three years; dead of measles; the liquid passed readily through the ileo-cæcal orifice, filling the small intestine.

CASE V.—Child, aged three years; dead of measles; the liquid refused to pass. A post-mortem examination showed that the colon was over-distended and that there was a twist in the ileum against which the distended colon pressed, rendering it impossible for liquid to pass into the ileum.

CASE VI.—Female child, aged eighteen months; dead of measles; the liquid failed to pass both before and after opening the abdominal cavity. In this case the ileo-cæcal valve was small and the lips of the valve were in close apposition, rendering it impossible for any liquid to pass from the colon into the small intestine.

CASE VII.—Child, aged two years; the liquid refused to pass; upon examination the ileo-cæcal valve was found to be competent.

These examinations show that in two cases the valve was competent to prevent irrigation of the small intestine; and in one case, owing to a peculiar twist in the ileum and the pressure of the over-distended colon, liquids failed to enter the ileum. This case is particularly instructive, and shows that in a certain number of cases success may be looked for, even though the first attempt prove a failure. In four cases there was no difficulty whatever in the passage of liquids from the anus to the stomach, or even out through the mouth and nose.

In addition to these facts, several of my patients, to whom injections of tannic acid had been given, vomited tannic acid, thus proving that the solution had passed through the ileo-cæcal orifice.

The feasibility of introducing liquids from the rectum into the small intestines having thus been proven, the next question that naturally arose was as to the character of the liquids, and the method of application. Acting upon the knowledge that the comma bacillus is destroyed by acid, it is evident that this substance should be an acid; and, furthermore, this acid should be incapable of doing harm to the intestinal mucous membrane; a substance possessing astringent properties would also be of benefit; and further advantage would be secured by heating this liquid so as to supply warmth, as the temperature of cholera patients is usually subnormal. Of all the substances that have been

advanced to meet these indications, tannic acid is, in my opinion, the best, and the solution that was habitually used in the treatment of the cholera cases in New York Bay was a 2 per cent. solution of tannic acid in water (or three teaspoonfuls to the pint), at a temperature of 110° F. Of this solution two quarts may be given to an adult, one to an adolescent, and one pint to a child. The solution should be introduced very slowly, and I advise for this purpose the use of a medium-sized soft rubber tube having a diameter of one-fourth of an inch. The one found most useful was originally intended for lavage. It should have one outlet one-half inch from the extremity, and a second on the opposite side two inches from the extremity, and the terminal portion should be closed so as to present a rounded extremity, which greatly facilitates its introduction (*c*). In an adult this tube should be thoroughly warmed, well oiled, and gently and slowly introduced into the rectum by a rotary movement and slight pressure, for a distance of ten inches. Occasionally the first attempt will be unsuccessful, in which event the same procedure should be repeated, changing slightly the direction of the tube. To this soft-rubber rectal tube should be attached an ordinary fountain syringe (*a*), which is the same as the one suggested for hypodermoclysis. The liquid in the reservoir should have a temperature of 110° F., which will be lowered 5° before it will have entered the small intestines. The advantages of this simple apparatus are that the hydrostatic pressure may be modified immediately to suit the particular case in question, and in this manner the rate of discharge of the liquid may be regulated. It is absolutely necessary that the tannic acid solution should be *slowly* introduced, and ten minutes should be required for the introduction of one quart of this liquid. Three or four minutes should be allowed to elapse, while gentle pressure is made on the anus, and the patient should be encouraged to retain the injection, even though there be a strong desire to evacuate it. Not infrequently, if this desire is overcome, it will be retained without further difficulty. The tube should be slowly withdrawn. If the injection is retained, it will inhibit the growth of the comma bacillus; it will supply heat to the body in the most advantageous manner possible, and, if absorption takes place, it will supply a much-needed fluid. If the liquid be rejected the first objects are obtained in part, and the intestinal tract is flushed of its contents, thereby removing poisonous material which, by absorption, would endanger life. In severe cases enteroclysis may be repeated as often as every four hours.

As *coldness* of the body and *lowering* of the *central temperature* is an almost constant condition in Asiatic cholera, it becomes necessary to supply heat. This has been accomplished by heating the liquids used in hypodermoclysis and enteroclysis, and also by the hot plunge bath, which should always be given to patients in this stage. This bath may

be repeated as often as is deemed desirable; and I should further advise that the entire skin surface be covered by soft, woollen under-garments immediately thereafter, and from time to time hot air may be conducted beneath the bed-clothing. Advantage may also be taken of hot air; hot-water bags; hot sand bags, or hot bricks, which may be placed near the body, more particularly about the extremities. The patient should be covered by two woollen blankets and a counterpane. A most excellent suggestion, by which heat may be added to the body, has been made by Dr. Francis X. Dercum, namely, that the patient be placed upon a water-bed, which may be filled with hot water.

Stimulation. The best method of administering stimulants is by deep hypodermatic injections of brandy, repeated every hour or less frequently, according to indications. For an adult, 30 minims may be employed; for an adolescent, 15; and for an infant, 5 minims. During the stage of collapse, if, at any time, there is a tendency to vomiting, it is wise to avoid administering *any* substances by the mouth.

Lavage. As the stomach frequently contains large quantities of choleraic liquid, it is often advisable that a soft-rubber stomach-tube be introduced, and that lavage be thoroughly performed, using for this purpose a hot tannic acid solution, such as is employed in enteroclysis.

Nourishment. The only nourishment that should be administered is peptonized or sterilized milk in small quantities, about two ounces every two hours. If this is not well received, it may be surcharged with carbonic acid gas, or koumyss may be substituted. Iced champagne, in small quantities, may also be given. The only liquid that should be permitted is carbonated distilled water, or table waters, such as Apollinaris. Twenty to forty drops of hydrochloric acid may be administered with the carbonated water at intervals of four hours.

Drugs. In all the cases of cholera that I have treated no drugs have been employed other than those before mentioned. Particularly conspicuous is the omission of opium and of those drugs which have been universally advised in this disease. The only cases where drugs became necessary were those where intense pain was caused by muscular cramps, in which event to an adult was given morphine $\frac{1}{6}$, and atropine $\frac{1}{100}$, hypodermatically into the muscles affected. This symptom of cholera was rarely met with in the cases treated by hypodermoclysis and enteroclysis, and this rarity is easily understood when it is remembered that the muscular symptoms are the result of the obstruction of liquids from the tissues of the body, so that, when liquids are supplied, this symptom rarely appears. The enormous list of remedies suggested, such as camphor, capsicum, chloroform, creasote, turpentine, amyl nitrite, arsenic, phosphorus, copper, lead, etc., I believe to be not only useless but harmful.

3. STAGE OF REACTION.—During this stage the quantity of liquid food may be increased as well as the quantity of liquids. The hydrochloric acid should also be continued. If the suppression of urine, which is almost invariably present in the stage of collapse, continues, this would be an indication for the continuance of hypodermoclysis at intervals of eight hours. The enteroclysis should now be suspended. If the temperature is normal, artificial heat should be withdrawn; and if reactive fever shows itself, the woollen under-garments should be removed and the patient should be covered with a very light-weight woollen blanket. In order to encourage more perfect digestion, five grains of pepsin should be administered along with the hydrochloric acid. In favorable, uncomplicated cases the amount of nourishment may be gradually increased, passing from liquid food to more solid substances, such as boiled rice, bread saturated with milk, junket, poached *white* of egg, etc., gradually returning to ordinary food. In those cases where the typhoid stage of the patient remains, the hypodermoclysis should be repeated once or twice daily, and, in addition to what has been suggested, $\frac{1}{40}$ grain of strychnine and three grains of quinine may be administered every four hours, along with the hydrochloric acid and pepsin.

PUERPERAL INFECTION CONSIDERED FROM A BACTERIOLOGICAL POINT OF VIEW, WITH SPECIAL REFERENCE TO THE QUESTION OF AUTO-INFECTION.¹

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To Ignaz Semmelweiss is due the credit for having rescued the puerperal diseases from the realm of hypothesis and theory, and for demonstrating that in the vast majority of cases they are due to infection from without, and thus placing them, to a greater or less degree, within the category of preventable affections.

His great services were not at first appreciated, and not until the introduction of antiseptic methods into surgery did they receive the attention which they merited. With the advances in anti- and a-septic surgery, however, it was found that his views were based upon sound observation and were entitled to the greatest possible consideration; so that now he is justly regarded as the father of antiseptic midwifery, and

¹ Read before the Medical and Chirurgical Faculty of Maryland, April, 1893.

his name will go down with that of Lister as one of the great benefactors of mankind. At present, so great is the admiration in which he is held that steps have recently been taken to raise an international fund for building a monument in his honor in Budapest, his birthplace.

With the advances in bacteriology, and the increasing knowledge of the relations which micro-organisms bear to suppuration and septic disturbances, it has gradually been established that the puerperal affections do not represent a class of diseases *sui generis*, but are identical with the affections which follow the infection of wounds in other parts of the body, and are due to the same micro-organisms; in other words, puerperal infection is wound infection.

By a long series of observations it has gradually been established that most of the fatal cases of puerperal disease have been due to infection with the streptococcus pyogenes. Before the employment of cultural methods for isolating micro-organisms various observers found chains of micrococci in the tissues of various organs of women dead of puerperal fever. Mayrhofer,³⁵ in 1865, was the first to publish such an observation, and was rapidly followed by others, among whom may be mentioned Rindfleisch,⁴³ Coze and Feltz,⁹ Recklinghausen,⁴² Waldeyer,⁵¹ Klebs,²⁹ Orth,³⁹ Heiberg,²² Landau,³² Spillman,⁴⁷ Doléris,¹⁴ and others.

Pasteur,⁴¹ in 1880, was the first to cultivate the streptococcus from the organs of women dead of puerperal fever. Similar results were likewise obtained by Fränkel,¹⁸ Iovanovic,²⁴ Lomer,³⁴ Winckel,⁵⁴ Bumm,⁵ Döderlein,¹¹ Winter,⁵⁵ Ott,⁴⁰ Czerniewski,¹⁰ Widal,⁵³ and others, so that at present there can be no doubt that the streptococcus pyogenes stands in a causal relation to a very large proportion of the fatal cases of puerperal disease. One of the most convincing articles upon this subject was written by Widal,⁵³ who found streptococci in nearly every case in which he performed an autopsy, and who was able to demonstrate that the most divergent forms of puerperal affections, as puerperal ulcers, endometritis, parametritis, peritonitis, septicæmia, pyæmia, and even phlegmasia alba dolens, could all be traced to the same cause; namely, streptococcus infection.

Streptococci are not, however, always the sole cause of puerperal diseases, for, just as various other organisms may lead to wound infection and sepsis in other portions of the body, so may they also give rise to puerperal wound infection.

Thus, Brieger⁴ was the first to show that the staphylococcus might cause fatal puerperal fever, and his statements were soon verified by Czerniewski,¹⁰ Fehling,¹⁵ Hägler,²¹ Döderlein,¹² and others. Staphylococci do not, however, frequently cause the more severe forms of the disease, but it is generally admitted that they frequently give rise to mild cases, as was first pointed out by Hägler,²¹ an assistant to Fehling.

Not infrequently staphylococci are combined with streptococci in

these affections. Döderlein¹² reported a small epidemic, which occurred in Leipzig in 1887, which was due to a combination of these two forms of organisms.

In a certain number of cases the organisms of putrefaction are supposed to play a part in the production of puerperal affections, not so much by their action as pus-producers as by the absorption of poisonous ptomaines, which are the result of their life processes. This is the class of cases which Matthews Duncan designated as *sapræmia*, and with which most of us consider ourselves familiar.

To us, however, it is doubtful whether they are of as frequent occurrence as is generally supposed, and we do not hesitate to believe that a considerable number of the so-called cases of *sapræmia* are not due to the putrefactive organisms at all, but are the result of slight infection with the ordinary pus producing organisms. We are strengthened in this belief by the statement of Bumm⁷ (1891), who found streptococci lacking in only three out of eleven cases, which appeared clinically to be typical cases of putrid endometritis. And very lately (1893), Von Franque,¹⁹ in a clinically typical case of *sapræmia*, found only a pure culture of streptococci in the retained lochia. Supported by several similar observations, he concludes his article with the following sentence: "The occurrence of *sapræmia* in the puerperium is rare; it should only be diagnosed when an accurate bacteriological examination of the lochia demonstrates the absence of pathogenic and the presence of saprophytic organisms."

We do not desire to be understood as stating that there is no such thing as *sapræmia*; for as yet we are unable to express a positive opinion upon the subject.

Gonococci are occasionally the cause of some of the milder cases of puerperal disease. For years this has been a favorite theory with Säger and many others, and within the last few months it has been clearly demonstrated that such may be the case. For in the *Centralblatt für Gynäkologie* of February 25, 1893, Krönig³⁰ makes a preliminary communication on "Gonorrhœa in Wochenbett," in which he states that he has obtained a pure culture of the gonococcus from the interior of the uterus, in nine cases in which there were slight febrile disturbances during the puerperium. He further states that all the cases recovered without treatment. There can be no doubt as to the correctness of Krönig's³⁰ statements, for he is an assistant in the Gynecological Clinic at Leipzig, and no doubt his work was done under the supervision of Döderlein, who is an expert bacteriologist as well as obstetrician.

Von Franque,¹⁹ in his recent article, reports a case of puerperal infection of moderate severity, in which he found a pure culture of the colon bacillus in the uterus, unaccompanied by any other organism.

That the organism was virulent was shown by the fact that the pure culture readily killed guinea-pigs and rabbits.

As far as we can learn, this is the first instance in which the colon bacillus has been said to be the cause of puerperal infection; but when we consider the proximity of the genital tract to the rectum, where colon bacilli abound, we should not be surprised at Von Franque's find; but rather that the same organisms have not been found in the uterus in other cases.

That still other organisms may occasionally lead to puerperal infection is extremely probable. Kuliscioff³¹ states that he believes that eventually the bacillus proteus will be considered as a cause for puerperal infection. His statements, however, have not yet been verified; but we are quite prepared to believe that the bacillus proteus may give rise to these troubles; for we have seen a case of fatal peritonitis (Flexner¹⁷), as well as an ovarian abscess caused by it.

That still other organisms may play a part in these processes is rendered quite likely by the statement of Witte,⁵⁶ who has isolated five varieties of bacilli from the vagina, all of which are found to be pathogenic for rabbits.

Very lately (April 6, 1893), in a fatal case of puerperal tetanus, Heyse²³ has succeeded in demonstrating tetanus bacilli in the cervical secretion obtained during life. In this case forceps had been employed and the placenta extracted manually. The demonstration of tetanus bacilli in the dust obtained from the cracks between the boards of the floor of the room in which the woman had been delivered, renders it most probable that the woman was infected by the accoucheur.

Heyse's case is very thoroughly worked out and is of great interest in connection with the facts already adduced.

To resume. We will state that scientific proof has been adduced which demonstrates that puerperal infection may be due to the invasion of the wounds of the genital tract by the streptococcus pyogenes, the staphylococcus aureus and albus, the gonococcus, and the colon bacillus. It is quite probable that some of the putrefactive organisms play an important part in the production of sapraemia, and it is possible that the bacillus proteus, and perhaps other organisms, may be capable of giving rise to puerperal infection.

Thus we see that various, very diverse micro-organisms, especially the streptococcus and staphylococcus, may give rise to puerperal infection, and that the organisms concerned are identical with those connected with the usual forms of wound infection. (See Welch: "Conditions Underlying the Infection of Wounds," THE AMER. JOURN. OF THE MED. SCIENCES, November, 1891.)

We have thus briefly indicated the various organisms which may be concerned in puerperal wound infection, and at the present time no one

will deny that in the vast majority of cases the offending micro-organisms are brought to the woman from without by hands or instruments which are introduced into her genital tract; in other words, that we have to deal with direct wound infection, just as well as the surgeon.

Semmelweiss⁴⁵ recognized this fact nearly forty years ago, when he said: "The decomposed organic-animal material which causes childbed fever when absorbed, in the vast majority of cases is brought to the individual from without. These are the cases which represent the epidemics of childbed fever; these are the cases which can be prevented." And at the present day the only change which one could make in Semmelweiss' statement would be to substitute the words pathogenic micro-organisms for "decomposed organic-animal material."

The question now presents itself: Is external infection the only cause of puerperal infection? Must the obstetrician attribute every case of puerperal infection to the effect of organisms, which he himself has introduced into the woman's genital tract? Or can he say in a certain number of cases that the infection is due to no fault on his part, but rather to conditions which existed within the genital tract prior to his examination?

In other words, is there such a thing as auto-infection?

Semmelweiss⁴⁵ said there was, in the following sentence: "In rare cases the decomposed organic-animal material which causes childbed fever when absorbed, is produced within the borders of the affected organism; these are cases of auto-infection and cannot all be prevented."

We now know that all wound infections are due to micro-organisms, which must be introduced from without, for they cannot originate independently within the body; consequently auto-infection, as conceived by Semmelweiss,⁴⁶ cannot exist.

In the first flood of the rigid antiseptic era, the possibility of auto-infection was generally denied, and for a time all puerperal troubles were attributed to external infection. This state of affairs continued for some time, but gradually obstetricians found, in spite of what they considered most rigid antiseptic precautions, that they did not have ideal puerperia, and that puerperal fever was not absolutely abolished, and although they treated the lying-in woman as they would a severe surgical case, they did not have so good results as the surgeons.

To explain the difference between the ideal puerperium and the imperfect results attained, Ahlfeld,¹ of Marburg, rehabilitated the auto-infection idea. He took the most extreme views as to the frequency of auto-infection and included under that term many cases in which there could be no reasonable doubt of external infection.

Ever since then the subject has been constantly before the obstetrical world, and all varieties of arguments have been advanced both for and against it, and considerable temper not infrequently displayed.

The fact of the matter is that the term auto-infection is an unhappy one, and the entire discussion has been one more of words than facts; for neither side has been able to give a perfectly clear definition of what they mean by the term, and consequently, in any discussion, the opposing sides have no common ground upon which to stand.

The question as to the possibility of auto-infection, accordingly, resolves itself simply into a consideration of the definition of the term.

From what has been said above there can be no hesitation in denying the possibility of auto-infection as conceived by Semmelweis.⁴⁵

On the other hand, it is quite possible that pathogenic organisms may exist in the genital tract during pregnancy without giving rise to any symptoms whatever, and only exert their influence during labor or the puerperium, when the wounds which follow labor will afford abundant opportunity for their absorption. This, of course, is only a variety of external infection, the only difference between it and the usual form of contact infection being the length of time that the offending micro-organisms have been in the genital tract; in other words, we have to deal with direct and indirect infection. Thus, for example, admitting that the vagina may contain pathogenic organisms, it is conceivable that they may lead to infection, without any further introduction of organisms from without.

This is practically the definition given by Kaltenbach²⁵ at the German Gynecological Society in 1888, and is what we understand by the term auto-infection.

Regarded from this standpoint, therefore, the possibility of auto-infection must stand or fall with the demonstration of pathogenic organisms within the genital tract of pregnant women who have not been examined. Can it be shown that pathogenic organisms are present under these conditions?

Kehrer,²⁸ Karewski,²⁷ and others of the earlier observers stated that the lochia of healthy women always contained substances which were capable of producing suppuration when injected into animals, and also that their virulence increased with the length of time after the labor.

From this they concluded that it was always possible for a woman to be infected from her own lochia, and the only reason that it did not occur more frequently was that the wounds resulting from the labor had healed before the lochia had time to attain their greatest virulence. This work was done without the most approved aseptic precautions, and is therefore of practically no value.

As the methods of bacteriological research became more perfected, a number of investigators busied themselves with this question, and at first their results were very contradictory.

Gönnér²⁰ (1887) examined the vaginal and cervical secretions from 31 healthy women, and found pathogenic organisms in none of them; he

accordingly stated that in healthy women the vagina contained large quantities of non-pathogenic organisms, from which, however, there was absolutely no danger of auto-infection.

He was soon followed by Döderlein,¹¹ who obtained the lochia directly from the uterus, and found in non-febrile cases that they were free from micro-organisms; while in febrile cases they contained large quantities of organisms, usually streptococci; the vagina always containing numberless germs of the most various species.

The next year (1888) Winter⁵⁵ examined the uterine secretions in non-pregnant women, and concluded that they were free from micro-organisms, but that the vagina and cervix contained many varieties. In one-half of his cases he found the staphylococcus albus in the vagina; in all, he cultivated twenty-seven different varieties of organisms from the vaginal secretion, including all varieties of strepto- and staphylococci. His work substantiated that of Döderlein,¹¹ and both agreed that the character of the vaginal secretion afforded abundant opportunity for auto-infection.

Ott⁴⁰ was likewise able to confirm the statements of Döderlein¹¹ and Winter⁵⁵ as to the absence of organisms from the interior of the uterus; but he also stated that in healthy puerpera the lochia from the upper portions of the vagina were free from organisms, and consequently could not offer an opportunity for auto-infection. In fever cases, on the contrary, he found various organisms in the lochia whether obtained from the uterus or vagina.

Czerniewski¹⁰ examined the uterine lochia from 57 lying-in women with, and 77 without fever. In only one woman without fever could he find organisms in the uterus; while in all the fever cases he found large quantities of organisms, principally streptococci, most of which were proved to be virulent.

It is evident, from the work to which we have just referred, that all the investigators in this field agree in stating that the interior of the uterus in healthy women, whether in the normal or puerperal state, is absolutely free from micro-organisms; while in febrile puerperal cases they are always present and are usually streptococci. Work by Strauss and Sanchez-Toledo,⁴⁹ upon the lower animals, has also demonstrated that the healthy uterus is absolutely free from micro-organisms.

On the other hand, the great majority of investigators agree that the vaginal secretion frequently contains pathogenic organisms, but a few, as Gönner,²⁰ Thomen,⁵⁰ and Samschin,⁴¹ state that they have been unable to find pus-producing organisms in it. To their statements are opposed the work of Winter,⁵⁵ Döderlein,¹¹ Widal,⁵³ Steffek,⁴⁵ Witte,⁵⁶ and Burguburu,⁸ who have found pathogenic organisms in a larger or smaller proportion of the cases examined by them.

Steffek,⁴⁵ who is one of the most pronounced auto-infectionists, ex-

amined the vaginal secretions from 29 pregnant women, and found that 41 per cent. of them contained pus-producing organisms, as was proved by inoculation experiments upon animals. From this he concludes that the possibility of auto-infection is clearly demonstrated, and, in consequence, advocates most thorough disinfection of the vagina to guard against its occurrence.

It is thus seen that the results of the various observers stand out in marked contrast to each other; the one side apparently proving that auto-infection is impossible, and the other that it has abundant proof in its favor.

How can these differences in apparently good work be reconciled?—for it is hardly possible that either side is absolutely in the wrong.

The explanation of these apparently contradictory results was furnished in 1892 by Döderlein,¹³ in his work on the *Vaginal Secretion*. Basing his work upon the consideration of 195 cases, he was able to show that a marked difference exists in the vaginal secretion in different cases, and was able to distinguish two varieties of vaginal secretion, namely, normal and pathological.

He states that the normal vaginal secretion is a whitish material of the consistency of clotted milk, and always has a strongly acid reaction. Under the microscope, it contains almost exclusively a long bacillus, a few epithelial cells and occasionally a few yeast cells.

The pathological secretion, on the other hand, generally has a yellowish or yellowish-green color, is of a creamy consistency, and often contains small gas bubbles or masses of tenacious mucus. Its reaction is usually weakly acid, and not infrequently neutral or alkaline. Under the microscope, this pathological secretion is immediately seen to be different from the normal; it contains large quantities of various kinds of micro-organisms, bacilli as well as cocci, and considerable quantities of leucocytes and epithelial cells. Generally a single glance through the microscope is sufficient to distinguish between the two varieties of secretion.

Of his 195 cases, 55.3 per cent. presented normal, and 44.6 per cent. pathological vaginal secretion.

He found that the bacillus of the normal vaginal secretion is a long, slender bacillus, which has peculiar modes of growth and produces an acid allied with lactic acid, to which is due the normal acidity of the vagina. He also found that it was non-pathogenic, and large amounts of it might be injected into animals with impunity. He accordingly concludes that the normal vaginal secretion presents absolutely no possibility for auto-infection; but rather appears to be inimical to the pus-producing organisms; for small quantities of them, when introduced into a vagina with normal secretion, are rapidly killed.

On the other hand, he showed that the pathogenic vaginal secretion

did afford an opportunity for auto-infection; for, in 10 per cent. of the pathological cases he found the streptococcus pyogenes, which was demonstrated by inoculation experiments to be pathogenic in more than one-half of the cases.

In the light of Döderlein's¹³ work, the divergent results of the various investigators are readily explained by supposing that those who obtained negative results happened to experiment with normal vaginal secretions; while the other observers met with both kinds of secretions.

Through the courtesy of Prof. Michel, who has kindly allowed us to make use of his material at the University of Maryland, we have been able to substantiate to a certain degree the interesting work of Döderlein.¹³ So far we have only had opportunity to examine the vaginal secretion from 15 pregnant women who had not been previously examined. Of course, it is impossible to draw numerical conclusions from so small a number of cases, and all we can say is that our work has clearly demonstrated that Döderlein's distinction between normal and pathological vaginal secretions is certainly justified.

We will now give a very short account of the results of our investigations, reserving the purely technical portions of the work for a later publication, when we hope to be able to report our results based upon a considerable number of cases. We obtained the vaginal secretion from pregnant women, who had not been examined previously, by means of a cylindrical glass speculum, which had been sterilized by steam, and removed portions of secretion from the posterior cul-de-sac of the vagina, with the usual precautions, by means of a platinum loop. The secretion was first tested as to its reaction, then cover-glass preparations were made, and lastly various culture media were inoculated.

In 4 cases we found the secretion to correspond exactly to Döderlein's¹³ normal secretion, being intensely acid and containing a pure culture of the vaginal bacillus, occasionally with a few yeast cells.

In 2 cases we found the vaginal bacilli and unidentified cocci.

In 1 case we were unable to obtain any growth upon our media, and in 8 cases we found various organisms which correspond to the usual pus-producing organisms—usually, associated with other organisms. Thus, we found the streptococcus in 2 cases, streptococcus and staphylococcus aureus in 1 case, staphylococcus aureus in 1 case, staphylococcus albus in 3 cases, and staphylococcus epidermidis albus in 1 case.

Thus it is seen that in 8 cases we have found in the vaginae of non-examined pregnant women organisms which correspond in every particular to the ordinary forms of pus-producing organisms, and among them the streptococcus has occurred three times. In nearly all of the cases the reaction of the secretion was altered, but especially in the three in which streptococci were found. In one of these cases it was neutral, and in the other two very slightly acid.

Inoculation experiments upon rabbits, with pure cultures of the streptococci, gave negative results; but, in spite of that, we believe that we have had to do with pus-producing organisms; for it is well known what very inconstant results follow their inoculation into rabbits.

Our results, combined with the positive results of Burguburu,⁸ Döderlein,¹³ Steffeck,⁴⁸ Winter,⁵⁵ and others, make it perfectly clear that pathogenic organisms are frequently found in the genital tract of women who have not been examined, and consequently prove beyond all question that auto-infection is perfectly possible.

Having thus shown that auto-infection is a possibility, it is of the greatest importance to decide how often it occurs, and whether we must reckon with it in our daily obstetrical work.

It is evident that its frequency can only be determined by reliable statistics; for it is readily seen that if pathogenic organisms occur in the vagina in 41 per cent. of all cases, as stated by Steffeck,⁴⁸ and their presence be all that is necessary for the production of auto-infection, the human race should long since have been destroyed. It is evident that other conditions beside the presence of pathogenic organisms within the vagina must be necessary for the production of auto-infection. Just what conditions are necessary we are at present, unfortunately, unable to state.

Ahlfeld,² Kaltenbach,²⁶ and others of the more radical school of auto-infectionists, believe that auto-infection occurs very frequently, and, as we have indicated above, include under that head many cases which are undoubtedly due to external infection. Such being the case, their estimate of its frequency would be misleading. On the other hand, there is a considerable number of obstetricians who hardly believe in its existence. For example, Slavjansky,⁴⁶ in preparing his article upon "Obstetrical Antisepsis," for the International Medical Congress, at Berlin, in 1890, wrote to the directors of fifty-two lying-in institutions in Russia, and, among other questions, asked how often auto-infection occurred. All of the answers were in the negative, except one from the University of Dorpat, where one case had been observed. This, no doubt, represents an exaggeration upon the other side of the question, and it appears to us that the question of the frequency of such affections is best answered by the statistics of those who do not employ vaginal douches, and rely upon subjective antisepsis and thorough cleansing of the external genitals, or those who can present a series of cases in which the women were neither douched nor examined internally. Such statistics have been presented lately by Mermann³⁸ and Leopold,³³ and we will now briefly consider their results.

In March of this year, Mermann³⁸ reported a series of 900 labors, in which only subjective antisepsis was employed, the vagina not being douched even in operative cases. He has included among his fever cases

all rises of temperature above 100° F., even those due to extra-genital causes; and as his experience, and that of his assistants, has increased in subjective antiseptics, his morbidity has gradually fallen from 21 to 6 per cent. His cases are frequently examined, and still his results are excellent. He justly says that the difference between 21 and 6 per cent. is due entirely to increased experience in subjective antiseptics, and that no one should think of attributing any of the 15 per cent. difference between 21 and 6 per cent. to auto-infection. Among the 6 per cent. are included all rises of temperature, even those cases which entered the institution already infected, and those in which the rise of temperature was not due to genital affections. With these results, he asks, is there any room for auto-infection?

During the past five years, Leopold,³³ of Dresden, has devoted a great deal of attention to the subject of fever in the puerperium. Previous to 1889 he employed prophylactic vaginal douches in all cases; since 1889 he has not used them, except in operative cases, and has found that puerperal infections occur only five-ninths as often without their employment as formerly. He accordingly concludes that prophylactic vaginal douches are not only unnecessary, but in many cases are absolutely harmful. During five years, from 1886 to 1890, he has had 919 labors in which the women were not examined at all; 12 of them had mild attacks of puerperal infection; in 10 the infection could be attributed to other causes, and only in 2, or 0.21 per cent., was it possible to attribute the infection to auto-infection.

When we compare the results of Leopold³³ and Mermann³⁸ with the known fact that bacteriological research shows that pathogenic organisms are frequently present in the genital tract, it becomes evident that auto-infection cannot play so large a part as we would be inclined to admit from a consideration of the bacteriological work alone.

How can this apparent contradiction of clinical and scientific facts be accounted for? In the first place, our every-day experience teaches us that the presence of pathogenic organisms does not necessarily result in the infection of wounds. This has been demonstrated by Bossowski⁸ and others, and more recently by Welch and Howard,⁵² who introduced considerable quantities of virulent cultures of the staphylococcus aureus into the fresh blood-clots of wounds antiseptically treated, without producing suppuration.

The same has been noticed in the puerperal uterus; for both Czerniewski¹⁰ and Von Franque¹⁹ have in rare instances obtained streptococci in pure culture from the interior of the uterus in apparently perfectly healthy women.

It appears, then, that beside the presence of micro-organisms, certain conditions, of which we are as yet ignorant, are necessary for the production of infection. It is more than probable that certain products of

bacterial life must accompany the micro-organisms for them to lead to infection, and it is possible that the organisms which grow in the vagina lack these materials, while those which are introduced directly from without possess them.

It is evident to anyone who considers the matter, that abundant opportunity is afforded, even in the cases which are not examined, for the organisms present in the vagina to gain access to the fresh wounds which result from labor, and this opportunity is greatly increased if an examination be made or an instrument or other foreign body be introduced into the genital tract. Of course, the entire mechanism of labor in normal cases is eminently adapted to prevent organisms which are in the vagina or cervix from gaining access to the body of the uterus. For, in the first place, there is the increased secretion which accompanies labor, then the bag of waters ruptures and more or less completely douches out the lower part of the genital tract. This is soon followed by the closely fitting head, after which comes another gush of amniotic fluid and blood, and lastly the placenta comes down, drawing all after it, just as a piston in a pump. This is admirably adapted for cleaning out the genital canal, and appears more suitable, as well as more natural, than any sort of douche which we might give.

From a consideration of the clinical and bacteriological facts here adduced, it is evident, theoretically, that auto-infection should frequently occur, but practically it is of comparatively rare occurrence. In the cases in which the vaginal secretion is normal, there is absolutely no possibility for its occurrence; and in the cases in which the vaginal secretion is pathological, it does not occur nearly so often as one would expect, although conditions which are apparently favorable for its occurrence are frequently present.

Such being the case, we believe that the general practitioner will do best for himself and his patient if he acts as if there were no such thing as auto-infection, and does not attempt to deal with any organisms which may exist within the vagina, and contents himself with the most scrupulous cleanliness on his part and careful disinfection of the external genitals of his patient. As soon as the practitioner admits that auto-infection occurs, his only rational procedure is a prophylactic disinfection of the vagina, with all its disadvantages. And who does not believe that he will do far more harm than good with the douche, and introduce with it far more organisms than he kills or washes away? We can only agree with Mermann,^{36 37} who states that it is impossible to disinfect the vagina thoroughly with the means ordinarily at the command of the practising physician, and with the patient in her bed.

This does not apply at all to well-regulated hospital practice, for there the douche may be given with greater antiseptic precautions. But to us it appears that routine vaginal douching, even in hospital work, is

capable of doing more harm than good. The question of prophylactic vaginal douching is, however, still *sub judice*, and at present it would appear ill-advised for us to condemn it unreservedly.

We believe that the best results will be obtained when, in addition to the most rigid subjective antisepsis, we consider each case separately, and make a preliminary microscopic examination of the vaginal secretion. If the secretion be normal there can be no possible justification for the use of the douche, but if it be pathological there may be.

Döderlein¹³ states that vaginal injections of 1 per cent. lactic acid will frequently convert pathological into normal secretions within a few days. We have not tested this ourselves, but feel that it should be tried if possible. When there is not sufficient time for the lactic acid injections, or if they fail to accomplish the desired end, we should resort to the prophylactic sublimate douche. This applies to hospital practice, but we repeat once more that the conception of auto-infection is dangerous for private practice, and will lead either to neglect of subjective antisepsis or to the prophylactic douche and all the consequences of meddlesome midwifery.

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SIMPLE IDIOPATHIC MUSCULAR ATROPHY BEGINNING IN THE FLEXORS OF THE HIPS—BUZZARD'S FORM.

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OBJECTION has been made to the multiplication of types of muscular atrophy distinguished, not by difference of kind, but merely by the place of onset and the spread of the disease. Undoubtedly, it is of the first importance to distinguish between the three different kinds of atrophy, but further subdivision, according to the location of the disease, is of great importance as an aid to diagnosis.

Dr. Thomas Buzzard,¹ in his presidential address before the Neurological Society of London, in January, 1890, described a new form of paraplegia, beginning in the iliaco-psoas muscles. He gives brief notes of four cases, in each of which the principal symptom was weakness of flexion of the hips, involving a corresponding difficulty in the execution of such movements as placing the foot upon a chair, mounting stairs, or stepping over an obstacle. In two of the patients, one male and one female, the paralysis was confined to flexion of the hips, and was not influenced by treatment. In another female patient the knee-jerks were very feeble, and extension of the knee was weak. The Weir Mitchell treatment restored the knee-jerks and extension of the knee, but flexion of the hips was not restored. The fourth patient, also a female, suffered an extension of the paralysis to all the muscles of the lower limbs. This patient had two sisters suffering from toe-drop, and in the anterior tibial muscles of one of them there was complete loss of faradic reaction.

Taking the hint from the hereditary predisposition in this family, and the electrical changes in the muscles, Dr. Buzzard regards this form of paraplegia as due to simple idiopathic muscular atrophy beginning in the iliaco-psoas muscles, and considers it especially as being liable to be mistaken for hysteria.

In reporting a case of the same kind I must confess that, although warned by a previous reading of Dr. Buzzard's address, I supposed it was a case of hysteria until the electrical reactions proved the existence of organic disease.

Mrs. E. K., aged forty-seven years. Family history good. Married at thirty-three; widow for past three years. No children; two miscarriages. No history of venereal disease or excessive use of alcohol. In 1886 there was an eruption of herpes on the left shoulder and inner side

¹ "On the Simulation of Hysteria by Organic Disease," *Brain*, Spring No., 1890; also published in book form by J. & A. Churchill, London, 1891.

of the left arm. Came to Colorado from England in April, 1891, and was then in robust health; could walk ten miles at a stretch without much fatigue; weighed 135 pounds. In the early summer of 1891 it became difficult to ascend stairs, because of the great effort required to raise the knee so as to put the foot upon the next step. This was the first symptom of disease. Walking on level ground was not interfered with, but it was hard to step over any obstacle in the way. Soon after this she noticed a feeling of weakness in the lumbar region, which seemed to extend round to the thighs and knees. She was now unable to run or to walk fast, even on level ground. She next became unable to rise from a chair without the support of her hands. In attempting to lift anything from the floor she would carefully stoop sidewise and use one hand as a balance. Very recently, turning in bed has been difficult, even the weight of the bedclothes appearing to prevent it. There has been no fibrillary twitching of the weakened muscles, and no pain, except a little between the shoulders and in the lumbar region. Appetite, digestion, and sleep have been good. Bowels and bladder always normal. Weight has increased ten pounds.

Present condition—May, 1892. Appearance of robust health. Grasp, flexion of elbow, and especially extension of elbow, weaker than normal on both sides. Walks fairly well forward or backward, but can only with the greatest difficulty lift either foot more than a few inches from the floor. While sitting cannot, even with the utmost exertion, place one knee over the other without lowering the under one. When kneeling, she cannot rise without grasping some support. Before rising from a chair she carefully takes the most favorable posture, and then rises by pushing with her hands upon the thighs. In the lower limbs faradic reactions are greatly diminished, though for the most part retained. Knee-jerks barely perceptible without reinforcement; very slight, though distinct, when reinforced. There is no evident atrophy of any of the muscles, but they are covered by an unusual thickness of subcutaneous fat. Sensibility to touch, pain, temperature, and posture perfect. Heart, lungs, and urine normal.

September, 1892. There is a decrease in the strength of the muscles formerly affected, and a new difficulty is complained of in carrying an object in both hands, and especially in placing it upon an elevated shelf. The knee-jerks are absolutely abolished.

Ankle: extension and inversion of fair strength; dorsal flexion and eversion very weak. Knee: extension fair; flexion weak. Hip: extension weak; flexion almost abolished. The right lower limb is a little weaker throughout than the left. Strength is much better retained in the upper than in the lower limbs. The patient can stand on tiptoe and walk without conspicuous toe-drop, but she descends stairs stiffly, with a shock at each step. Ascending stairs is excessively slow and fatiguing. When standing erect there is some lumbar lordosis; a plumb-line from the spine between the shoulders falls two inches behind the heels. The tibialis anticus and common extensor of the toes on each side are wasted. There is no appearance of muscular hypertrophy in any part of the body. Electrical examination of the lower limbs is difficult on account of the thick layer of fat and the pain caused by the high currents necessary. The accompanying table gives the main results, most of which have been verified by repeated tests. The weakest galvanic current producing a contraction is given for each muscle. The

faradic irritability is rated according to the current required to produce a minimal contraction, not according to the actual strength of the contraction, which, in most muscles, is very slight even with the strongest currents available.

Symbols used: Ma, milliampères; KCIC, kathodal closure contraction; AnCIC, anodal closure contraction; AnCl—, anodal closure, no contraction.

	Galvanic reaction.	Faradic reaction.
Gastrocnemius, right,	9Ma, KCIC very slight, barely greater than AnCIC; 15Ma, KCIC > AnCIC, both weak and sluggish.	Much diminished.
Gastrocnemius, left,	10Ma, KCIC, AnCl—; 12Ma, KCIC > AnCIC.	Much diminished.
Tibialis ant., right,	15Ma, KCIC, AnCl—.	Barely perceptible.
“ “ left,	19Ma, KCIC > AnCIC.	Much diminished.
Ext. comm. digit., right,	9Ma, KCIC = AnCIC.	Diminished.
“ “ left,	10Ma, KCIC = AnCIC.	“
Peroneus longus, right,	10Ma, KCIC, AnCl—.	“
“ “ left,	10Ma, KCIC = AnCIC.	Much diminished.
Biceps fem., right,	20Ma, KCl—AnCl—.	None obtained.
Semitendinosus, right,	18Ma, KCIC, AnCl—.	Much diminished.
“ “ left,	18Ma, KCIC, AnCl—.	“ “
	20Ma, KCIC > AnCIC.	
Rectus fem., right,	20Ma, KCIC = AnCl—.	Barely perceptible.
“ “ left,	20Ma, KCIC, AnCl—.	None obtained.
Biceps brach., left,	7Ma, KCIC, AnCl—.	Slightly diminished.
	9Ma, KCIC > AnCIC.	
Triceps, left,	8Ma, KCIC, AnCl—.	

In both arms all the muscles reacted to faradic currents of moderate strength. The extensors of the fingers required the strongest currents; the intrinsic hand muscles the weakest. In the lower limbs the faradic reactions were worst in the recti and anterior tibials, and best in the intrinsic muscles of the feet. It will be noticed that no muscle gave the reaction of degeneration or showed any marked predominance of galvanic over faradic irritability. In a few muscles, as well as I could judge of the feeble contractions produced, anodal closure contraction equalled kathodal closure contraction, but it never predominated.

May, 1893. There has been no substantial change, except that the muscles used in raising the arms above the head have grown very weak. The patient thinks that the strychnine and the small doses of arsenic given have increased her command over the other weakened muscles.

The important features of this case are: 1. The onset in the inaccessible iliaco-psoas muscles. 2. Failure of electrical reactions to both currents, without reaction of degeneration. 3. Electrical loss being least in the intrinsic muscles of the hands and feet. 4. The atrophy of the anterior tibial group. 5. Absence of any indication of hypertrophy or of fibrillation. 6. Absence of any manifest hereditary taint. 7. Loss of knee-jerk. 8. Rapid progress of the disease.

The existence of organic disease is made certain by the loss of knee-

jerk, the electrical changes, and the muscular atrophy. No doubt atrophy was widespread, though not easily recognized in most muscles. But had the disease remained limited to the flexors of the hips the distinction from hysteria would have been very difficult. A comparatively slight involvement of the quadriceps would diminish the knee-jerk, and Buzzard makes the important statement that knee-jerk is probably never lost in hysteria, but almost invariably exaggerated.

Neuritis being excluded by the complete absence of sensory loss, the diagnosis is limited by the chronic progressive paralysis, the atrophy, the electrical changes, and the loss of knee-jerk, to one of the forms of muscular atrophy. Here we have to distinguish between spinal, pseudo-hypertrophic, and simple idiopathic atrophy.

The point of onset and the subsequent spread of the paralysis are strongly against a spinal origin. Even the possibility of this case representing a hitherto unrecognized form of spinal atrophy may be fairly excluded, considering the rapid course, by the absence of reaction of degeneration and the failure of galvanic irritability, along with that of faradic irritability, as well as by the absence of fibrillation.

Against pseudo-hypertrophic muscular atrophy we have not only the absence of any appearance of hypertrophy, but also the age and sex of the patient.

This brings us to a diagnosis of simple idiopathic muscular atrophy, with which the condition of the muscles is in entire harmony. It may be urged that this disease begins in youth and affects other members of the same family. Yet it may begin as late as sixty, and isolated cases certainly occur. Against the improbability of one case being exceptional in both these particulars, we must consider the obvious resemblance to Buzzard's cases, in one of which hereditary tendency was manifest.

No doubt this is but a rare form of a rare disease: nevertheless, we should know of its existence. Moreover, experience shows that rare diseases become less rare as soon as they are generally known. We cannot tell, for instance, how many such cases have been classed with hysteria, or simply allowed to pass as puzzling and obscure.

REVIEWS.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS. By HOBART AMORY HARE, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; Physician to St. Agnes's Hospital and to the Jefferson Medical College Hospital, etc. Third edition, enlarged and thoroughly revised. Pp. xvii., 696. Philadelphia: Lea Brothers & Co. 1892.

A TEXT-BOOK which reaches its third edition within two years has certainly found favor in the eyes of the medical profession. The present edition contains additional information upon some comparatively recent remedies, introduces several of the newer drugs, adds a list of drugs arranged according to their physiological action, and a list of definitions of the terms used to designate classes of drugs. The opportunity has also been made use of to correct the errors which are inevitable in a work of this character. A striking feature of the book is the alphabetical arrangement of the section devoted to Drugs. While it is undoubtedly true that no one classification would be acceptable to more than a respectable minority of teachers, yet we believe that for a student some classification, imperfect though it may be, is useful, that he may learn the properties of allied drugs and subsequently differentiate them. An attempt to supply this want is made in the list above mentioned, but we fear that the reader may look upon it as a table of contents rather than meriting serious study. The statements to be found in this book are unusually concise, yet occasionally are found some that are indefinite: "Carbonate of ammonium is largely employed by surgeons in the treatment of children after surgical operations." Rarely are there contradictory statements. On page 30 we are told that astringents "act not by coagulation of albumin," but further reading shows that both alum and nitrate of silver (pages 57 and 245) do act in this way, and yet the author classifies these drugs as astringents on page 36. When the word turpentine is used it means oil of turpentine (page 328); yet on page 156 we are told that flexible collodion contains turpentine.

As a result of lack of uniformity in the indexing of drugs, we find bromide of ammonium on pages 61 and 97, and iodide of ammonium, on pages 63 and 199; in the latter instance the dose-limit is not identical. We believe that an adherence to the pharmacopoeial name would have prevented this duplication, and would have given an opportunity to group all salts of each metal under one heading, instead of obliging the reader to consult the index. Incompleteness of statement in this section is unusual. In view of the recent literature, we believe that a caution against the administration of castor oil following that of male fern would have been timely, the mention of the use of hydrastis in uterine hemorrhage, of creasote in the form of enteric pills, and of the exhibition of drugs intended for action in the intestines in the same form.

The section devoted to Diseases presents on the whole a satisfactory plan of treatment for each disease or symptom enumerated, and here diseases and symptoms are intermingled. Naturally we find reflected the author's own practice, and that in a very marked degree. We might expect that every drug here mentioned would appear in the section devoted to that subject, so that the student may refer to the description of its properties. Yet under abortion is found viburnum; jambul is mentioned under diabetes mellitus; benzoate of magnesium is recommended in gastric dilatation, but none of these are indexed or described. We had expected to find resorcin mentioned under the head of dyspepsia, the use of menthol as an anti-emetic, the salicylate treatment of pleuritic effusion, and the use of intestinal antiseptics in typhoid fever. A few sections are unsatisfactory, as, for instance, that on tetanus, in which it is stated that the treatment is virtually identical with that of strychnine poisoning, to which the reader is referred under the head of *nux vomica*. The reference recommends, *inter alia*, the use of the stomach-pump, and draughts of water containing tannic acid, which are manifestly without indication in tetanus. The sections devoted to General Therapeutical Considerations, Remedial Measures other than Drugs, Foods for the Sick, are very satisfactory in scope, and contain much valuable information. The index of Diseases and Remedies, we believe, could have been easily omitted, for practically the same information is contained in the section on Diseases; and further, it reminds one of the usually unsatisfactory therapeutic index. The index of Drugs and Remedial Measures should have been more complete in synonyms; for instance, nitroglycerin alone is found, while glonoin and trinitrin, both mentioned in the text, are omitted.

In the selection of new remedies the author has been conservative; some which apparently have secured a permanent place in therapeutics, as *pichi*, are omitted. We can be assured that all the remedies found are those whose reputations are already secure. A careful reading of this book gives a high degree of satisfaction; physiology and therapeutics are here brought closely together; a few, and the more probable, theories are offered as the ground for the accepted practice; conciseness is the rule rather than elaboration of detail, and with the exception of several examples of inelegant expression, and use of colloquialisms, the diction is excellent. The criticisms offered are criticisms of detail rather than of method, particularly in the section devoted to diseases, and call for increased editorial work on the future editions. The book has already taken high rank, which we believe to be deserved and likely to be maintained.

R. W. W.

LECTURES ON MENTAL DISEASES: DESIGNED ESPECIALLY FOR MEDICAL STUDENTS AND GENERAL PRACTITIONERS. By HENRY PUTNAM STEARNS, A.M., M.D., Physician Superintendent of the Hartford Retreat; Lecturer on Mental Diseases in Yale University, etc. With illustrations. Philadelphia: P. Blakiston, Son & Co., 1893.

DR. STEARNS' book is pre-eminently clinical. It is written entirely from that standpoint by an author who makes no pretensions to, and gives but little evidence of, pathological interests and acquirement; and

it is addressed especially to medical students and general practitioners. It occupies one extreme of a series of text-books, the other extreme of which is held by the remarkable treatise of Bevan Lewis. It is as different from the latter as day is from night—not an inapt simile, because Stearns' treatise will convey clear light upon elementary clinical facts, especially to the general practitioner; whereas Lewis' profound and learned work would but lead him in the (to him) dark labyrinth of an intricate and but partly-explored pathology. Dr. Stearns' book, in fact, is remarkably deficient in pathology and morbid anatomy. If this is the author's design he has succeeded admirably, and has accordingly written a manual that will be helpful to the physician who merely reads and runs; but that it will be a good book for the student, unless supplemented, is doubtful. We say this, because we think that students need more neuro-pathology than they are getting in many of our schools, or than Dr. Stearns will give them. Moreover, the pathology and morbid anatomy of some of the insanities are subjects now of especially great interest; they should claim the attention of all physicians who think it worth while to purchase and read a treatise on mental diseases. Among these forms are alcoholic and epileptic insanity, general paresis, confusional psychoses especially of toxic origin, delirium grave, acute mania, and brain syphilis. The clinical records of these diseases, we may say, are about complete; their pathology alone offers a comparatively fresh field and a chance for original treatment. Because of its limitations in this field Dr. Stearns' manual will not be of special value to the advanced student or to the expert.

The book is rather lacking also in literary reference and in evidence of the exercise of the critical faculty. This latter is so essential now to a proper understanding of past and contemporary work that its almost complete absence calls for a brief note.

The merits of the book, as we have said, are in the clinical descriptions. The author evidently writes almost entirely from personal observation of his own patients in the Hartford Retreat. This gives his book its own particular stamp of individuality and originality. Its merits, like its faults, are its own, and are doubtless the proper and natural outgrowth of its antecedents and its environment. This is saying much in its favor. The book is the work of a close and wise clinical observer, fresh from his own wards, who writes for the instruction of his own class in a great university. Hence it is the product of a natural growth, and has a reason for its existence. We do not know of any work, unless it be Clouston's, in which there are fresher and more graphic descriptions of the various mental diseases.

In his first chapter, on the "Physical Basis of Thought," Dr. Stearns indulges in some speculation, in which we cannot follow him closely here. He seeks to avoid a frank materialistic explanation of psychic phenomena, and hence, as is always the case with those who do so, is soon involved in a hopeless metaphysical maze. We think the best antidote for this is a study of pathology.

In his classification of the insanities, after a very thoughtful discussion of the subject, Dr. Stearns cuts the dilemma right in half and adopts a system founded in part upon symptoms and in part upon causes. He recognizes that it is too early to say the final word upon the classification of phenomena which are as yet but partially understood. Here pathology must give the final decision.

The author discards the terms "monomania" and "paranoia" for the more exact term "primary delusional insanity." He describes this as a neurosis, either inherited or developed. By thus recognizing the non-hereditary form of the disease he is in close accord with some of the more recent French writers, especially Magnan, who contends, in opposition to the partisans of monomania, that there is a "*délire chronique d'évolution systématique*," quite distinct from the hereditary psychosis.

Dr. Stearns attributes the peculiar cycle of "*folie circulaire*" to the exaggerated development of that habit which is common to all brains, namely, a tendency toward reaction. It is the expression, we may say, of a Promethean disease, grafted upon a vicious organization, relentless as fate in its ever-recurring cycles of exaltation and depression. The author, with profound insight, recognizes in this disease the fundamental law of the nerve-cell, in its rhythm of alternate nutrition and discharge, perverted here by some mysterious morbid influence into a fatal alternation of excitement and reaction.

Dr. Stearns does not seem to recognize sepsis as an element in the causation of puerperal insanity. As he has had exceptional opportunities to study this disease (in 175 cases observed by him in the Retreat) it seems to us most remarkable that he does not even mention this as a possible cause. He does not, in fact, give much recognition anywhere in his book to the various septic and other infectious processes as possible causes of mental disease, except in his very excellent chapter on delirium grave. Under this heading he treats of post-febrile and post-operative insanity. We do not doubt that he is right in associating these disorders with delirium grave, which latter disease, we believe, is often the result of some infectious process; and yet, from his own clinical standpoint, it might have seemed better and more helpful to the student to have made a separate chapter on acute confusional insanity, to which class they more properly belong. Puerperal insanity, itself, as we have usually seen it, is more truly a *delirious* than a *maniacal* state.

The proof-reading of the book has not always been carefully done. We note several glaring grammatical errors, as one on page 351.

We think that Dr. Stearns' book will commend itself as a helpful guide to many practitioners; and within the limits which we have pointed out, and which were probably designed by the author, we think it is an excellent work.

J. H. L.

A TREATISE ON DISEASES OF THE RECTUM, ANUS, AND SIGMOID FLEXURE.

By JOSEPH M. MATTHEWS, M.D., Professor of the Principles and Practice of Surgery in the Kentucky School of Medicine. New York: D. Appleton & Co., 1892.

THE work before us is distinctly *not* a compilation. The author has formed his own conclusions from a vast clinical experience, which he has reinforced by a careful study of the opinions of others. He sets forth his views with commendable clearness, and emphasizes his convictions with praiseworthy courage. The style is clear, forcible, and graphic; the text is adorned with some eighty illustrations; and the publishers' portion of the undertaking is most worthily performed.

The introduction is of extreme practical value, treating with gratifying care all of those minute methodic details of position, examination, illumination and instrumentation which do so much to make or mar the success of our diagnosis and treatment. Next comes a luminous outline of rectal anatomy, and then a chapter on the "Symptoms of Constipation, and What It Means."

In Chapter IV. the author maintains the thesis that antiseptics are to be used in rectal surgery, for by so doing we promote the rapidity of healing and lessen the danger of septic infection.

Chapter V. deals with Hemorrhoids. External hemorrhoids, he tells us, are of two kinds, first, of soft livid enlargements near the anus, due to rupture of a vein wall, and not, as is taught, to clot in a cyst or a dilated vein. Second, an enlargement of skin-tags, which pre-existed around the anus, this form never attacking those who have a smooth surface in this region. The first variety is to be treated by excision, not by the old method of incising and pushing out the clot; the second, by excision after tying the base with a ligature.

Internal hemorrhoids are admirably treated of in Chapter VI. Their treatment by injection of carbolic acid he most decidedly condemns, because it may cause death, dangerous hemorrhage, stricture of the rectum, ulcers of the gut, and bad internal fistulæ.

Crushing he has tried and abandoned, on the ground that it gives considerable risk of sepsis.

The clamp and cautery he uses only in selected cases, viz., "where there is a large amount of superfluous skin around the anus, which is embraced in, or goes to make up, a part of the internal hemorrhoid," the excision of which would cause severe bleeding.

Excision by the method of Allingham is regarded as difficult and unsafe.

Dilatation of the sphincter by the method of Verneuil seems to Dr. Matthews to be without merit as a means of absolute cure.

Whitehead's operation for excision of the entire hemorrhoidal plexus, or rather, as it is usually done, of the pile-bearing area, our author regards as "bloody, difficult, and tedious," as liable to permit a large suppurating area of non-union, as offering a premium to secondary hemorrhage, and as suited to but very few particularly aggravated cases.

Matthews is a warm friend of the ligature, and insists that it is the treatment *par excellence*.

Fistula-in-ano receives thorough discussion. The term is properly condemned, as the fistula has anatomically little to do with the anus. In looking for the internal opening, if the surgeon fails to find it, he should push the probe to the depth of the sinus, and with it perforate the bowel. This procedure was long since suggested by Richerand.

Matthews reads a lecture to Gross, Brodie, Fergusson, and others, who oppose operation upon a fistula if phthisis exists. He would always operate in incipient phthisis; generally in rapidly progressive fistula; very rarely if cough is severe. He insists that in phthisis, if cough be not severe, healing is not retarded.

In some cases of fistula we can avoid cutting the sphincter by dilating the sinus with a laminaria tent and dividing its walls with a fistulotome. He does not approve of the ligature; strongly advocates cutting, being careful to find all sinuses, to clip edges, and to cut out the gristly channels, and being sure not to incise the sphincter in two places in

one operation. Lange's operation of excision possesses some points of merit.

The so-called nervous rectum points, in most instances, either to a lesion in the rectum, which a careful search will find, or a lesion in anatomical relation which induces reflex disturbance. The author seems to lose sight of those rectal spasms mentioned by Wood, which are apt to be associated with vaginismus and spasmodic dysmenorrhœa, and of the paroxysmal diarrhœa and paroxysms of rectal pain and tenesmus (crises), which Gowers tells us may be met with in locomotor ataxia. We find considered in order, Neuralgia, Irritable Ulcer or Fissure, Anatomy of the Rectum and the Reflexes, Ulceration, and Non-malignant Stricture.

In the chapter on Cancer we would take issue with the author when he says the term sarcoma means very little. He is not a warm friend of colostomy (it is here called colotomy, but colostomy is the proper term if we mean by it the establishment of a fistula more or less permanent). He thinks, with Jessop, that obstruction can generally be relieved by dilatation and other methods; that colostomy does not prevent pain, and does not prolong life. This view may be due to the fact that he prefers the lumbar operation, which does not completely arrest the feces at the artificial anus. The iliac operation gives a death-rate of only 5 per cent. (*American Text-book of Surgery*), and insures complete physiological rest for the bowel below the opening. Again, in describing iliac colostomy, no mention is made by Matthews of what is undoubtedly the most satisfactory method, that is, the operation by Maydl.

Kraske's operation has not been accorded that fulness of description to which it seems entitled, considering the interest which has been excited by this radical procedure of the distinguished Freiburg surgeon.

A consideration of Disease of the Sigmoid Flexure, Prolapsus Ani, Pruritus Ani, Impacted Feces, Villous Tumor of the Rectum, and Malformations of the Rectum and Anus, close this most valuable book.

We commend this work emphatically, and, although high authorities differ from him on not a few points, we can assert that the author advances no view which he does not believe sustained by examples from his extensive experience, and of the truth of which he is not profoundly convinced.

J. C. DA C.

A DICTIONARY OF PSYCHOLOGICAL MEDICINE, GIVING THE DEFINITION, ETYMOLOGY AND SYNONYMS OF THE TERMS USED IN MEDICAL PSYCHOLOGY, WITH THE SYMPTOMS, TREATMENT, AND PATHOLOGY OF INSANITY, AND THE LAW OF LUNACY IN GREAT BRITAIN AND IRELAND. Edited by D. HACK TUKE, M.D., LL.D. In two volumes. Philadelphia: P. Blakiston, Son & Co., 1892.

If any proof were wanting beyond the name of the editor that we had an important work before us, surely the names found among his collaborators would more than justify this opinion. As is stated in the preface, the work is the first of its kind which has been attempted, and it aims at providing information more or less systematic in regard to the definition, etymology, and symptoms of the terms used in medical

psychology, with the symptoms, treatment and pathology of insanity, together with an abstract of the law of lunacy in Great Britain and Ireland.

A brief glance at the pages of the book soon shows that we have here presented not merely a number of short definitions of words, but in reality articles of greater or less length, treating of the various forms of mental disorder and of the most important subjects which fall under psychological medicine. We have, therefore, rather a *system* of psychological medicine before us than a dictionary. At the same time it must be stated that none of the articles are of unwieldy length. In addition, the subject is introduced by two most valuable and interesting general papers: the first, entitled "Historical Sketch of the Insane," embraces a digest of the subject from most ancient to comparatively modern times, and in its pages illustrates no small amount of historical research. It is fitting that it has been written by the editor.

Next follows a very valuable article upon "Philosophy of Mind," which is signed by W. C. Coupland, and is a clear and not too abstruse consideration of the subject. After discussing the method and conditions of psychological inquiry, the various faculties of the mind—sensation, perception, ideation and imagination, memory, thought, feeling, and will—are considered. A brief historical outline closes the chapter.

Among the contributors are distinguished names of England, America, France, Germany, Russia, and Italy. It would seem unfair almost to mention any of them without detailing the entire list; however, we cannot refrain from mentioning such names as Blandford, Lauder Brunton, John B. Chapin, Charcot, Clouston, Victor Horsley, Pierre Marie, E. Mendel, Ludwig Mayer, Mierzejewski, Playfair, Sydney Ringer, George J. Romanes, Savage, Siemerling, Tamburini, and Gilles de la Tourette.

It is impossible from the wealth of material in these volumes to speak of any in detail. Taken together, the various articles upon insanity would form a very complete treatise. The ultra-scientific side of the subject is represented by excellent articles upon the "Anatomy and Functions of the Normal Brain," by Alexander Bruce; upon "Criminal Anthropology," by Havelock Ellis; and upon "Criminal Brains," by Moritz Benedikt.

The medico-legal aspects of insanity are well represented by exhaustive articles on "Criminal Responsibility in the Insane," by W. Orange; "The Law of Evidence, in its Relation to Lunacy," by A. Wood Renton; and by a very practical section on "Medical Experts," by the last-mentioned author.

Not only does the work contain full articles upon insanity and related subjects, but also an enormous number of brief definitions of terms used in neurological and psychological medicine; and these are not all confined to the Latin, Greek, and English terms, but even German and French expressions receive elaborate treatment.

Appended to the work is a valuable bibliography of the subject of insanity, also a list of the psychological societies of the world, and, finally, a list of the various journals upon insanity and allied subjects. In order to facilitate the labor of the reader a very full index, covering 64 pages of finely printed matter, is added, so that various subjects under the most diverse heads are readily found.

The practical value of this book cannot, it seems to us, be over-estimated, nor can it be too highly praised. The editor deserves the heartiest congratulations upon the success of this most difficult undertaking. We predict for this book a long life as a work of reference—as a work, indeed, which no alienist or neurologist can afford to be without.

F. X. D.

GEOGRAPHICAL PATHOLOGY: AN INQUIRY INTO THE GEOGRAPHICAL DISTRIBUTION OF INFECTIVE AND CLIMATIC DISEASES. BY ANDREW DAVIDSON, M.D., F.R.C.P., etc. New York: D. Appleton & Co., 1892.

THE two volumes which comprise this work comprehend a collection of exhaustive researches upon the vital statistics, climatology, and pathology of the various countries of the globe. We are obliged to confess some surprise at the method of arrangement which the author has adopted, for we expected on opening the book to find malarial fever thoroughly discussed in all its relations to geography in one chapter, typhoid fever in another, and yellow fever in a third, etc. Instead of this, the author writes his descriptions by countries, which, while perhaps more convenient for the geographer, is rather less so for the pathologist, who, to secure a definite idea of the distribution of a disease, must well-nigh read the entire book.

The work is replete with maps, tables, charts and statistics, which are excellent, with the exception of the figures relating to the United States, which are all based upon the census of 1880, thus being not only incorrect, but scarcely giving us a fair showing in comparison with other countries.

As regards the United States, we are told that the death-rate from malaria is higher than in most countries of Europe. The death-rate from typhoid fever is 30.19 per 1000 total deaths as compared with 15.69 per 1000 in England.

Scarlet fever is less fatal than in England, while phthisis is much more so, the proportion being 12,095:10,159 in 100,000. Next to phthisis, pneumonia is the most fatal disease, the deaths per 100,000 in the United States being 8330, while in England they are only 4724. The article on pneumonia is excellent. The author calls attention to the fact that statistics gleaned from the best sources in the United States are unreliable; and it is really lamentable that, while other countries have accurate means of securing correct figures, our systems of registration are so lax, and some of our diagnosticians so poor (alas that we must admit it!) that our figures can be called "unreliable."

Among the many interesting facts to which our attention is called we mention that leprosy is a widely distributed disease, occurring in nearly all countries, especially along the coasts. It seems to be distinctly on the decline, and generally affects the aborigines rather than the Caucasian race. It is unknown in Australia except among a few Chinese, and was unknown in the Sandwich Islands until 1840, when it is believed to have been introduced by Chinese emigrants. It has now become extremely prevalent, so that about 1 in 60 of the inhabitants suffer from it. In the United States lepra exists among the Scandinavian emigrants

settled in Minnesota, Wisconsin, Iowa, and Nebraska. Fifteen cases have been reported in Charleston, S. C., from 1847 to 1882. The total number of cases is supposed to be 50-100. While so rare in North America, lepra is common among the Indians of Mexico and South America.

While leprosy is on the wane and disappears as the white man spreads his civilization, syphilis takes its place, and plays dreadful havoc among the lower races. The author thinks syphilis unknown in America until brought here by the Europeans, and also shows that the savage races of all countries and the islands of the sea were free from it until sailors began to land there and colonies were founded. A curious fact is that syphilis is uncommon in Australia, a place whose original convict colonies would give us the idea of severe infection.

Cretinism in Switzerland is put down at 1.7 to the 1000 population, and wherever cretinism is common goitre is also common.

Malaria is thoroughly discussed, and we learn that in Rome the deaths are 12.8 per 10,000 population. The least affected parts of the city are the poor quarters, where the land is low and crowding considerable. The oases of the Sahara are extremely malarious.

Yellow fever is described under Cuba, which is regarded as its birth-place and where it is continually endemic. It is carefully compared with the numerous malarial diseases found there.

Care is taken to point out the incorrectness of the theory of an antagonism between phthisis and malaria, and figures are given showing this. Malaria is very common in Italy, but the deaths from phthisis number 23.9 in 10,000 deaths, showing how very common phthisis is.

Asiatic cholera is very thoroughly considered under the description of its ravages in India, its original source, in some parts of which it never disappears for any considerable length of time. From India, in the course of time, it has spread to nearly all countries of the world, indeed the only ones where no record of its existence can be found are Australia, Bermuda, Cape Natal and Zululand, Chile, Falkland Islands, Farøe Islands, Kamschatka and North Siberia, Madagascar, Russia north of 64° N. latitude, the Hebrides, Shetland and Orkney Islands, the west coast of Africa from Sierra Leone southward, St. Helena, Ascension, America north of Canada and south of the Argentine Republic.

The first recorded observation of cholera was in India in 1503.

All the visitations which America has suffered are traceable to infection from Europe. The first epidemic occurred in 1832, and was most severe along the Atlantic coast. In 1848-52 the second great epidemic occurred, and during it no part of the country escaped. The third was in 1854. The fourth was in 1866-67, and was confined almost entirely to the Mississippi Valley. The fifth was in 1873 and again was most severe along the Mississippi.

In Japan cholera became known in 1820, being carried there from China, and caused considerable ravages. In 1858 the U. S. frigate *Mississippi* introduced cholera to the islands, which spread rapidly and became so virulent that 100,000 persons were carried off in a month. In 1879 it is said to have killed 97,422 victims, and at present it is the disease which commits the greatest ravages in Japan.

The work is a careful compilation, and cannot fail to be of use to the pathologist and scientific physician. Its chief recommendation is the accuracy of its figures and tables, which are mostly selected from army

and governmental reports, and the convenience of numerous small maps so shaded as to show exactly how different areas of territory are affected by diseases.

J. McF.

A MANUAL OF THE OPERATIONS OF SURGERY, FOR THE USE OF SENIOR STUDENTS, HOUSE SURGEONS, AND JUNIOR PRACTITIONERS. By JOSEPH BELL, M.D., F.R.C.S. Edin. Edinburgh: Oliver & Boyd, 1892.

THE first edition of Bell's *Manual* was issued over twenty-five years ago, and that a seventh edition is now demanded is proof that it must be a work of sterling merit.

This book contains clear but comprehensive descriptions of the most usual and useful surgical operations, especially those which can be performed on the dead body, and hence, properly undertakes no demonstration of operations for tumors, necrosis, etc.

The first section deals with ligations, the next with amputations. The author attaches great importance to Syme's amputation at the ankle-joint, gives an admirable description of it, and calls attention to the unquestionable fact that many surgical manuals are in error as to its mode of performance, and that most of them vouchsafe so meagre a notice as to render clear comprehension impossible.

It is rather curious that no mention is made of Wyeth's method for the prevention of hemorrhage in hip-joint amputations, which is one of the greatest improvements of modern surgery.

Chapter III. presents the subject of Excision of Joints; Chapter IV., Operations on Cranium and Scalp; Chapter V., on the Eye (revised by W. G. Syme); and then follow descriptions of operations on the nose, lips and face, jaws, mouth and throat, air-passages, thorax, abdomen, pelvis, tendons, and nerves.

This little book is remarkably thorough; the descriptions are accurate to minute details. It is evidently written by a practical surgeon who is also a scientist, and we heartily commend it to all who would acquaint themselves with ordinary surgical procedures.

The book interests us for another reason, for we believe that its author is the person whose marvellous powers of minute observation and logical deduction have been embodied by A. Conan Doyle in his famous character of Sherlock Holmes.

J. C. DA C.

THE PRINCIPLES OF THEORETICAL CHEMISTRY, WITH SPECIAL REFERENCE TO THE CONSTITUTION OF CHEMICAL COMPOUNDS. By IRA REMSEN, Professor of Chemistry in the Johns Hopkins University. Fourth edition, thoroughly revised. Philadelphia: Lea Brothers & Co., 1892.

THE fourth edition of Professor Remsen's well-known book comes again enlarged and revised. Favorably commented upon and well received as this classical work appeared at first, each edition has enhanced its value. We may say, without hesitation, that it is to-day a standard work on the theory of chemistry, not excelled and scarcely equalled by any other in any language. Its translation into German and Italian

speaks for its exalted position and the esteem in which it is held by the most prominent chemists.

The clear, logical style of its diction, the proper selection of the labors of others, with the citation of the experimental evidences from which the deductions have been drawn, makes its reading and study a source both of pleasure and instruction.

The chapter on Solutions, newly introduced, with the relations between their vapor pressures and the molecular weights of the dissolved substances, together with the application of the researches of Pfeffer and De Vries on this subject, promises the development of new methods for the determination of molecular weights. Of interest, also, is the reference to the theories of Arrhenius and Claudius as to the probability of salts being decomposed into their *Ions* when dissolved, which are again growing in favor within late years.

It would lead to a review more lengthy than could be acceptable were only some of the most interesting or important features here quoted which are not generally found in literature, but which have been collected by the author and grouped with excellent judgment and commented on in a manner that shows an analytical mind and a facile writer.

We claim for this little work a leading place in the chemical literature of this country. To the scientific physician, whose researches for morbid elements lead him more and more into the study of chemistry, this work will not alone be one from which he may draw a clear conception of chemical matter and its composition, but one also which, after his wading through the labyrinth of empirical medicine, will both refresh his mind and fit it for pursuit in the direction of rational explanation of the many confusing problems that confront him. L. W.

NOTES ON THE NEWER REMEDIES: THEIR THERAPEUTIC APPLICATIONS AND MODES OF ADMINISTRATION. By DAVID CERNA, M.D., Ph.D., Demonstrator of Physiology in the Medical Department of the University of Texas, etc. Philadelphia: W. B. Saunders, 1892.

In this little book, Dr. Cerna has enumerated a vast number of remedies, not all of them new, we are afraid, and too many of them indifferent. Those new ones that deserve to be better known deserve a fuller introduction—and this, we think, Dr. Cerna will not deny. He has, indeed, noticed the fact that the enormous accumulation of new drugs is both a cause and a result of the excessive skepticism of some physicians and the excessive optimism of others. We mean that some men have too much faith in new medicines, and others too little, and that the swollen market of drugs, many times multiplied and compounded, is a cause. We are not opposed to new trials, for “he that will not apply new remedies must expect new evils.” But we are opposed to hasty and ill-conceived efforts with drugs, new and almost unknown, with nothing to recommend them but the dirty prospectus of an itinerant vender; for in this way it may happen that good medicines are contemned and mischievous ones exploited, and the science itself in the end lowered toward its old state of quackery and absurdity. Dr. Cerna is willing to make

trial of a new drug without sufficient experience to justify him, on the ground (the remark is not Dr. Cerna's, but he approves of it) that "Chemists are so multiplying compounds, that if each compound is to be thoroughly studied by the physiologist the result would hardly be contained in the world's literature, and it is worth while . . . to carry these investigations far enough to determine the practical importance of new agents."

Before we accept this extraordinary assertion, we desire Dr. Cerna to show us that we can safely abandon the ground taken by science, namely, that we must have some definite principle established by experience to go by, or to speak less generally, that before we think fit to use a new drug we must examine it with care and precision in the laboratory. In any case, when there are so many drugs to choose from, we must have some other and better method of judging them than Dr. Cerna's book affords, if we are not to act quite arbitrarily and take them all higgledy-piggledy. For his descriptions are too meagre to aid us in our choice. Too often they do not succeed in establishing any striking superiority, any strongly marked differences, aside from physical differences, among the new remedies, so that we can say of a drug in dispute, "Here at least it differs for better or for worse from another." In a word, we advise Dr. Cerna to enlarge his *Notes* and to give us a well-digested volume.

P. B.

THE CHEMICAL BASIS OF THE ANIMAL BODY. AN APPENDIX TO FOSTER'S TEXT-BOOK OF PHYSIOLOGY. (Sixth edition.) By A. SHERIDAN LEA, M.A., D.Sc., F.R.S. Pp. 280. New York: Macmillan & Co., 1893.

THE present volume, although bearing the same title and by the same author as the Appendix on the Chemical Basis of the Animal Body in the fifth edition of Prof. Foster's *Text-book of Physiology*, is practically a new book; it is a complete and systematic work, while the former Appendix comprised but an outline of the subject.

All the good features of Dr. Lea's past work are present in this volume, and, besides, he has made the most of the additional opportunity afforded by its greater scope. Written evidently with the purpose of reflecting the latest knowledge of the chemistry of animal life, the accurate has been thoughtfully sifted from the unreliable, and each statement set forth in brief and clear terms. Particularly to be commended are the number and completeness of the references, especially those relating to recent original papers and important publications.

After a general consideration of the proteids, their composition, reactions, and classification, the chemistry of each member of the several classes is taken up separately. Discussing the constitution of proteids, the author says: "It cannot as yet be said that we possess any real knowledge of the constitution of proteids, and the question will probably remain unsolved until some entirely new departure is made in attacking the problem, or until some new property of proteids is discovered by which their absolute purity may be determined as the necessary preliminary to the whole investigation. The so-called crystallized proteids have not as yet been prepared in sufficient quantity to admit of the easy and decisive application of the modern methods of organic chemistry to

the elucidation of their molecular structure. Work in this direction, on a really large scale, could hardly fail to yield important results. Schrötter has recently described the preparation of benzoylated ethers of the albumoses, and intends to apply the method to other proteids, and to study the products of decomposition and oxidation of these substances. Whether any real advance will be made in this direction cannot be foretold, but this new departure is of considerable prospective importance."

The enzymes, or soluble unorganized ferments, are treated of at considerable length, as befits their interest and importance as a group. In the special description of the more important enzymes, we notice that the fat-splitting ferment of the pancreatic secretion is termed "pialyn," and we doubt not that this name, from its more rational derivation, will in time supersede the term "steapsin," now in more general use. Another feature worthy of passing notice is the account of the "urea-ferment;" this enzyme the author looks upon as originating, not only through micro-organismal activity, but also as a secretory product. "The most prolific source of the urea enzyme is in all cases the mucous urine passed in inflammatory conditions of the bladder. In this case the enzyme appears to be closely associated with the mucin, and is presumably a secretory product of the mucous membrane, for it is frequently obtained when there has been no operative use of surgical instruments which could account for the introduction of micro-organisms from the exterior."

The careful description of the urea and the uric acid group emphasises one notable feature of this volume, which is the deservedly large share of space and attention devoted to those substances that, by their relation to animal metabolism, are of particular physiological interest.

The volume is pagged separately from the rest of the *Text-book* and has an excellent index of its own, besides an appended list of authorities quoted.

F. W.

THE DISEASES OF THE NERVOUS SYSTEM: A TEXT-BOOK FOR PHYSICIANS AND STUDENTS. By LUDWIG HIRT, M.D. Translated by AUGUST HOCH, M.D., assisted by FRANK G. SMITH, A.M. (Cantab.), M.D., with an Introduction by WILLIAM OSLER, M.D., F.R.C.P. With 178 illustrations. New York: D. Appleton & Co., 1893.

HIRT's *Treatise upon Nervous Diseases* has already been familiar to us in the original tongue for some three years, and our knowledge of it confirms the wisdom of the translators in placing so valuable a book in the hands of the English-reading public. The author tells us that he was influenced by the hope that here and there on certain points the treatment of the subject, by varying from that ordinarily adopted, might, while rendering the book more easily comprehensible to the beginner, make it none the less reliable as an adviser to those of wider experience. With this end in view he has considered the manner of dividing the subject-matter to be of no small importance, and has therefore chosen to discuss the diseases of the brain, those of the spinal cord, and those of the general nervous system separately, while diseases of the peripheral nerves, cranial as well as spinal, have been fully treated by themselves. A systematic discussion of the sympathetic system,

as well as of affections due to specific micro-organisms—for example, tetanus, lyssa—he has not attempted, partly because the space allotted would not allow it, and partly for other reasons. The author also calls attention in his preface to other peculiarities in his classification, which we shall presently consider. We find, for instance, that he first treats of diseases of the brain and its meninges, including those of the cranial nerves. This section is divided into the following parts: first, diseases of the meninges of the brain, then diseases of the cranial nerves, and, lastly, diseases of the brain proper. The second section embraces diseases of the spinal cord, and this likewise is considered in the way indicated above—namely, diseases of the membranes, of the spinal nerves, and of the substance of the spinal cord. The third and last section of the book is devoted to diseases of the general nervous system, and this section is, because of the details of its classification, especially interesting. Part I. deals with diseases of the general nervous system without any recognizable anatomical basis—"Functional Neuroses." Under this head are grouped: first, neuroses, which are wont to run their course without any essential implication of the general organism. They are chorea and the choreiform affections, tetany and paralysis agitans. Secondly, the author constitutes a group of neuroses in which the entire organism is more or less severely implicated, and under this head are neurasthenia, hysteria, epilepsy, and hysterio-epilepsy. It is probable that most neurologists will fail to agree with the learned author upon the basis on which the division of these two groups rests. Not only is there a form of chorea which is undoubtedly the result of a general infection, but some authors do not hesitate to hint that this may be true of all forms. Again, this is very probably true of tetany. Regarding paralysis agitans, our ignorance forbids our predicating any view. One of the latest investigators in this field, however, believes that it also has its origin in a general affection (Dana).

Part II. of the section on general nervous diseases is constituted of those which present a known anatomical basis, and under this head four diseases are grouped. They are: first, multiple sclerosis; second, tabes dorsalis; third, dementia paralytica; and fourth, syphilis of the general nervous system.

It is interesting and novel, as Dr. Osler points out in the Introduction, to find tabes dorsalis so classified. Regarding the propriety of such a classification there can be no doubt, if viewed from a strictly scientific standpoint. We very much doubt, however, whether the old plan of grouping this disease closely with lateral sclerosis is not the wiser, in a text-book intended for students. Certainly no two affections of the nervous system present such striking contrasts in their etiology and symptomatology as lateral sclerosis and locomotor ataxia. Clinical pictures are often best impressed upon a student by vivid contrasts. Further, while other portions of the nervous system participate, certainly the essential lesion of the disease is in the cord.

The text is condensed and clear, and admirably rendered into English. Numerous original illustrations are found in every chapter; these form, as Dr. Osler says, "a pleasing relief to the hackneyed cuts which have for so long passed from book to book in English works." A few of them are diagrammatic, anatomical, and morphological, but a large number are clinical. On the whole, the book forms an agreeable and refreshing addition to our stock of neurological text-books.

F. X. D.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE
MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

THE TREATMENT OF ASIATIC CHOLERA.

DR. FRANK ABBOTT, JR., from his observations made at Swinburne Island in 1892, believes that a 2 per cent. solution of tannic acid stops the growth of the comma bacillus and destroys its vitality in from one to three hours. He recommends one-half gallon of this solution, made with sterilized water, by enteroclysm at a temperature of 104° F., and injected into the colon by a flexible catheter not less than two feet long, the pressure being regulated by a fountain syringe at the height of about four or five feet. In some instances, when vomiting has not begun, calomel in doses of ten grains, repeated every hour until thirty grains have been taken, may prove of great advantage as a deterser of the intestines. All patients should be thoroughly washed in an immersion hot bath and their skin cleansed with slightly acid solutions. They should be put in a warm bed, and stimulants, such as hot coffee or hot tea, with brandy, administered. At the first signs of collapse, hypodermoclysis up to the amount of a quart should be resorted to. This solution is of the strength of seven parts of sodium chloride to one thousand parts of sterilized water, with the addition of ten parts of brandy or six parts of pure alcohol, if needed, and the whole raised to a temperature of 98.4° F. Hot-air baths are useful to maintain the temperature of the body. If there are symptoms of asphyxia, inhalations of oxygen seem to have been of benefit. Cramps are relieved by the combined action of hot-air baths and massage. Opium and all its derivatives, chloral, and bromides are contra-indicated. In the reactionary stage the nutrition of the patient and the restoration of the impaired action of the kidneys are the principal aims of the physician. Seltzer-water with milk, carbonated beverages, champagne in moderate doses, maltine with cod-liver oil in weak children, or

with peptones in older persons, as a substitute for a combined meat and cereal diet, and in those cases where duodenal digestion is poor, will be found beneficial. The convalescence is long and tedious, and notwithstanding the apparently good condition of the patients they are very debilitated, and the least error or excess in diet may give rise to serious complications. It is believed that treatment carried out as above, with careful attention to detail and begun early enough in the disease, may reduce the mortality to a still lower figure.—*The Medical Record*, 1893, vol. xliii. p. 363.

AN UNTOWARD ACTION OF PIPERAZINE.

DR. RÖRIG, in using this remedy upon patients undergoing treatment at the Wildungen Mineral Springs, has noted that it may produce an albuminuria, as determined by the picric acid test, reporting two cases. Piperazine is certainly not an entirely innocent remedy, and should be used with caution by those whose kidneys are unsound.—*Therapeutische Monatshefte*, 1893, Heft 3, S. 117.

A CASE OF PROBABLE POISONING BY BENZOSOL.

DR. B. VON JAKSCH, in the use of this remedy upon patients suffering from diabetes, reports that a man whose percentage of sugar was 5.7 to 5.8 per cent., received daily doses of from fifteen to forty-five grains for eight days. The sugar diminished during the use of the remedy, and disappeared three days before death. The symptoms were diarrhœa, marked icterus, small and rapid pulse, œdema pedum, hepatic and gastric tenderness, and coma.—*Berliner klinische Wochenschrift*, 1893, No. 9, S. 201.

TIN-POISONING.

DR. W. A. CAMPBELL reports six cases of gastro-intestinal disorder occurring in one family in a period of twelve days, one being fatal. The character of the alvine dejections suggested that the trouble was dysenteric. Investigation showed that the source of poisoning was the eating of tomatoes which had been preserved in cans which formerly contained peaches. These cans, having been ineffectually sealed with wax, had been re-heated and re-sealed. A chemical examination of the contents of a can revealed a comparatively large amount of tin and a small amount of lead. He concludes: 1. Stannous salts are poisonous to the human system, being similar in their action to the other mineral poisons—lead, zinc, arsenic, antimony. 2. The salts of tin are anthelmintic as well as the powdered product. 3. Toxic doses of the salts produce symptoms similar to those from ptomaines. 4. Canned-food products may contain stannous salts in poisonous quantities. 5. The danger from this source is increased from exposure to the air; hence, all fruits should be emptied from tin cans as soon as opened. The treatment pursued in these several cases was entirely symptomatic—astrigent, demulcent, anodyne, or stimulant, as the symptoms indicated. The diet was milk.—*The Therapeutic Gazette*, 1893, No. 3, p. 152.

THE TREATMENT OF DIARRHŒA.

DR. HEINRICH STEIN gives a brief *résumé* of the subject, considering especially the remedies which influence the functions of the alimentary canal. In the cases of undue motor activity of the intestine, opium acts upon the inhibitory nerves in the same way that digitalis does upon those of the heart, interfering with peristalsis and thus checking the diarrhœa. In connection with this remedy other means, as electricity or hydrotherapy, may be of assistance. Of the same mode of action is strychnine, but, of course, it cannot be considered on account of its great toxicity. A remedy which has a high degree of usefulness on account of its paralyzing influence upon the motor nerves of unstriated muscles is atropine, which has been proved by experimentation to possess this property. The use of preparations of belladonna in lead-colic is one of long standing. In case of indigestion in stomach or intestine, and absorptions of toxins, antiseptics are indicated, of which creasote is the one mentioned. Exceptionally the use of either galvanism or faradism can be recommended. If the former, two large electrodes are used, one upon the back and the other upon the abdomen, through which a moderately strong current (three to ten milliampères) should be passed. In some cases faradism has yielded good results. An electrode introduced into the stomach and the current passed outward to one upon the abdomen may be employed. The influence upon the temperature, changes in the calibre of the bloodvessels, and in peristalsis can be brought about by hydrotherapy, and the effect of heat upon the peristalsis is a long-recognized fact.—*Centralblatt für die gesammte Therapie*, 1893, Heft 4, S. 193.

THE TREATMENT OF MYXŒDEMA.

DR. JOHN P. HENRY reports one case cured by the use of the thyroid extract, which was administered hypodermatically, bi-weekly, in doses of thirty minims. After the first injection there was an epileptic fit; after the fourteenth, a small abscess formed; after the nineteenth, which was stopped after six minims had been given, there was faintness, great flushing of the upper part of the body, and pains in the back. The duration of treatment was about nine weeks.

MR. BENJ. DEE SHAPLAND has treated a case of ten years' duration by feeding with the thyroid gland of the sheep. The treatment lasted two months, and consisted in the taking of half an underdone thyroid gland the first thing in the morning with the ordinary food. The result of this method of treatment was satisfactory.—*British Medical Journal*, 1893, No. 1684, p. 737.

BHUTEA FRONDOSA.—*Roxb.*

MR. R. A. BANERJEE presents a brief clinical study of this Indian drug, also variously known as Palas, Kingsook, Dhak, Brahoma-virikhsh, Tesoo, and Mandar. This is the bark of a forest tree, the middle layer of which (the mesophlœum) exudes a gummy matter, which, when dried, forms small ruby-red, brittle masses, sparingly soluble in spirits, but soluble in water, forming a deep-red solution. It has an astringent taste, but it is quite odor-

less. It is sold in the bazaars under the name of *kamarkas* or *chunia ki goud*. It is much used in native practice as an astringent and tonic, and in some parts of India as a household remedy for serous diarrhœa and the pyrosis of pregnancy. In cases of diarrhœa and dysentery, when from extreme debility opiates and ipecacuanha could not be used, and when simple kino or tannic acid was found to be less effectual, this remedy has been used in the following doses: for children, five to ten grains with cinnamon powder, twice or thrice daily; for adults, twenty to forty grains, four or five times daily. If aromatics are not administered with it, wind is created. Seven cases are reported which illustrate its use. The remedy is cheap and easily procured.—*The Indian Medical Record*, 1893, No. 6, p. 182.

SUBCUTANEOUS INJECTIONS OF PHOSPHATE OF SODA.

M. ED. ÉGASSE, after reviewing the literature of the injection of the products of animal origin, has set out to determine whether phosphate of soda would not yield equally as good results as those obtained by Brown-Séquard and Constantin Paul. The preparation used was a 2 per cent. solution in cherry-laurel water, which was frequently renewed, thus avoiding decomposition. The amount employed was a little less than fifty minims daily, or every second day, injected into the arm or leg. Crocq, Jr., found that these injections acted purely as a tonic to the nervous system, the results being curative in those affections which depend only upon a functional disturbance of the cerebro-spinal axis, being only palliative when lesions of the nerve centres exist. These conclusions have not been, however, verified by other observers, although it is admitted there is a momentary tonic result, such as may be obtained by distilled water, chloride of sodium, and glycerin, but by no means comparable to that resulting from the use of the testicular extract. The conclusion appears to be justified that the value of the animal extracts does not consist alone in the phosphorus which they contain.—*Bull. gén. de Théraputique*, 1893, 12e liv., p. 265.

THE ACTION OF THE INORGANIC SALTS OF SERUM, MILK, GASTRIC JUICE, ETC., UPON THE ISOLATED WORKING HEART.

DR. W. H. HOWELL has shown that the belief that an isolated frog's heart beats because it is directly nourished by the proteids of the serum which is supplied to it, must be modified, to some extent at least. He finds that the inorganic salts of serum, when alone, and present in proper proportions to each other, are capable of keeping the heart beating for many hours, and this fact is sufficient to explain, in part at least, the so-called nutritive action of serum on the heart. After experimenting with the proteids, it was found that the beating heart consumes a very minute amount of proteid, if any at all, from the circulating liquid. This adds to the improbability of the view usually adopted, that the contractions of the heart under such circumstances are dependent upon the direct assimilation of serum albumin from the circulating liquid, and tends to confirm the conclusion that the constituents of the serum immediately concerned in starting the series of changes which precede the heart-beat are the inorganic salts, and especially the salts of calcium. Similar conclusions were reached in the case of milk, and of gastric

juice; with the salts of the saliva the action was much less favorable than with those above mentioned. It is not claimed that the experiments described prove that the inorganic salts of the blood act as a chemical stimulus to heart muscle or nerve, but they seem to support such an hypothesis, and lead us to think that the old theory of the causation of the heart-beat may not be so entirely beyond question as modern physiologists have assumed.—*Journal of Physiology*, 1893, Nos. 2 and 3, p. 198.

THE TREATMENT OF CHRONIC VALVULAR DISEASE OF THE HEART.

DR. JAMES TYSON notes the relief obtained from the occasional use of purgatives—five to ten grains of blue mass, followed by a saline, or the continuous use of small doses—one-half to one grain thrice daily. In regard to digitalis, the suggestion is made that the greater apparent effect of the infusion is due to its use in larger dose, although it is likely to be better borne by the stomach. Strophanthus, better borne by the stomach, has been used in doses of ten minims every two hours for forty-eight hours without interruption. Caffeine in three-grain doses every three hours, in mitral regurgitation, is admirable, but is likely to produce insomnia. Sparteine in one-quarter, increased to one-half grain dose, three to five times daily, is valuable if a diuretic effect is desired. For irregularity of heart action and palpitation, which are more common in mitral disease, belladonna is a very useful remedy. A belladonna plaster placed over a palpitating heart is one of the most efficient agents in subduing it; nitro-glycerin, one-one-hundredth of a grain, increased to double the quantity, three times daily, is often very useful to the same end.—*Therapeutic Gazette*, 1893, No. 4, p. 217.

THE CONTRA-INDICATION OF MORPHINE IN THE ASPHYCTIC FORM OF ANGINA PECTORIS.

DR. HENRI HUCHARD does not recognize in morphine the *ultima ratio* of the treatment of this condition; pain is not the dominating fact. The cause of death in the accidents of asphyxia and acute asystole is in the sudden failure of the cardiac muscle, and there are two indications to fulfil: 1. To facilitate the work of the myocardium, remove peripheral resistance by the use of trinitrin, nitrite of amyl, and stimulating frictions which dilate the bloodvessels. 2. Act directly upon the heart muscle, best by repeated injections of ether and of caffeine; in addition, injections of a 10 per cent. solution of camphor in sterilized olive oil may be useful.—*Revue gén. de Clinique et de Thérapeutique*, 1893, No. 15, p. 227.

THE TREATMENT OF ACUTE CROUPOUS PNEUMONIA IN CHILDREN.

DR. J. F. GOODHART believes that the simplest methods are, for the most part, the most successful: a little acetate of ammonium to induce diaphoresis; paregoric or Dover's powder to ease pain and not to interfere with the action of the skin; aconite, if the disease be acute; carbonate of ammonium as a stimulant; an occasional dose of an antipyretic might be useful. Poultices had been abandoned in favor of either hot or cold packs,

and a light cotton-wool jacket. The ice-bag to the chest was a very valuable method of treatment, and one that might safely be adopted in all but the youngest children without any undue precautions.

DR. HENRY ASHBY uses the methods given above, as well as digitalis or alcohol, and has found oxygen inhalation very useful as a temporary restorative. The cold, or rather the graduated bath in hospital practice had been followed by considerable success, but it undoubtedly requires care, as an alarming depression might easily be produced.

DR. C. N. GWYNNE did not consider that the ice treatment could ever be adopted as a routine treatment. If there was high temperature and great restlessness, antifebrin was a valuable adjunct to other treatment. Alcohol was unnecessary in most cases, and often harmful.

DR. MOSS MADDEN relies upon quinine or antipyrine in combination with small doses of gray powder, a milk diet, and, when stimulants are wanted, either brandy or whiskey in quantities proportioned to the age and condition of the child.

DR. SAMUEL WEST has found that antipyretic drugs are of doubtful value; baths and packs have their uses, but also abuses. Dyspnœa and cyanosis have but one means of relief—free venesection. Among the cardiac tonics he would give a high place to caffeine, either by the mouth or subcutaneously.—*British Medical Journal*, 1893, No. 1685, p. 782.

THE TREATMENT OF ASTHMA.

M. J. P. NUEL recognizes in the filaments described by Curschmann, in 1882, an important factor in the causation of bronchial asthma. Believing that these filaments, in the case of the eye, have their origin in a retarded elimination of corneal epithelium with a tendency to the formation of mucus, and noting that a two per cent. solution of chloride of ammonium favored this elimination and liquefied the mucus, he believes that the same remedy would benefit the bronchial asthmas, and this belief has been confirmed by the marked success attained by Dr. Delbovier.—*Bulletin de l'Académie Royal de Médecine de Belgique*, 1893, No. 2, p. 165.

ALUMNOL IN DISEASES OF THE THROAT, NOSE, AND LARYNX.

DR. ALBERT SPENGLER has used this recent addition to the materia medica in one-half, one, two, five, and ten per cent. aqueous solution applied by means of cotton to the diseased mucous membrane. These solutions are clear, of a brownish-yellow color, of a slightly astringent taste, and even in the ten per cent. solution are not caustic. Eight cases of acute and chronic pharyngitis, ten of acute and chronic laryngitis, and two of empyema of the antrum of Highmore, were under observation. Three cases of slight acute laryngitis were cured in from four to eight days by a twenty per cent. solution. In the various forms of pharyngitis, particularly of pharyngitis sicca, this remedy rendered good service, but without excelling that rendered by a one or two per cent. solution of chloride of zinc, although the former was much more pleasant for the patient. In diseases of the larynx the chloride of zinc gave better results. The two cases of empyema of the antrum of Highmore

were not benefited by syringing the cavity. In these cases the use of oxy-chinaseptol, otherwise known as diaphtherin, was followed by success. In three cases of empyema of the antrum of Highmore, and in five cases of ozæna, this remedy, employed in from one-half to one per cent. solution, was well borne by the patient, and demonstrated its extraordinary antiseptic power.—*Münchener med. Wochenschrift*, 1893, No. 13, S. 243.

ASPIDOSPERMINE.

DR. G. BORDET states that the aspidospermine of commerce is a mixture of several products derived from the quebracho aspidosperma, but it possesses practically the properties, excepting the antithermic, which is stronger than the contained quebrachine, of the pure alkaloid. It increases the depth and amplitude of the respiratory movements, slows the heart, and lowers the temperature. Huchard has recommended this drug in dyspnœa of functional origin. The dose is from one to two grains, which is soluble in water, with the addition of a few drops of a ten per cent. solution of sulphuric acid, which, however, should be neutralized by bicarbonate of soda, if it is intended for hypodermatic use.—*Les Nouveaux Remèdes*, 1893, No. 6, p. 135.

THE SIGNIFICANCE OF THE DIPHTHERITIC MEMBRANE IN ITS RELATION TO TREATMENT.

DR. M. J. OERTEL divides cases of diphtheria into two classes: 1. When the local manifestations are at the outset superficial; and 2. When they commence in the tissues themselves. Cases of the first class are due to direct infection, and require careful antiseptic treatment, which consists in the destruction of the bacteria and prevention of their increase, and the absorption of the virus which they produce. The further production of the membrane will be prevented by the removal of the cause of the disease.

The problem is to keep a sufficient amount of the antiseptic material for a sufficiently long time in contact with the diseased mucous membrane for its effectual operation. The use of remedies by gargling is unsatisfactory on account of the short time during which the remedy is in contact with the membrane. Painting the diseased mucous membrane with stronger antiseptic remedies produces much shorter time of contact; the remedy is diluted by saliva and mucus; it is not thorough in application, and requires frequent repetition. The application of remedies by the use solely of the steam atomizer is recommended; this permits of three to five minutes' contact, and can be repeated every two or three hours. Carbolic acid, in from 2 to 5 per cent. solution, used as above, has never given rise to poisoning, and yet seems to be the most suitable remedy.

In cases of the second class, where the membrane is a secondary manifestation of a primary general infection, the problem is entirely different. The place where the local antiseptic treatment should reach is one deep in the mucous membrane. The diphtherotoxine is already taken up by the lymph-cells of the blood and lymph and is widely distributed. Here local treatment, which tends only to the annoyance of the patient, and cannot exert a favorable influence upon the disease, is superfluous. However, the use of so-called

solvent gargles (alkalies, lime, soda) is of use in preventing stenosis of the air-passages, and, by disinfecting the mouth, in preventing the development of a septic form—a croupous form of diphtheria. Useless as remedies, and disturbing to the patient, are nitrate of silver, chromic acid, chloride of iron, and the galvano-cautery. Of constitutional treatment, that by blood-serum is based upon purely experimental researches and is uncertain, and chlorate of potash has been abandoned. The preparations of mercury, inunction or internal use of calomel, sublimate, or cyanide, have been followed by favorable results, although the knowledge of the action of these remedies upon zymotic processes is not sufficient to justify the statement that they possess a specific action against the diphtheritic process. From an empirical standpoint, the use of the cyanide is vindicated; so also is that of quinine. Its antipyretic and parasitocidal action is, however, open to question.—*Berliner klinische Wochenschrift*, 1893, No. 13, S. 297; No. 14, S. 331.

JAMBUL IN GLYCOSURIA.

DR. VIX contributes a brief report of the use of this remedy in two instances. In the first, about ten drachms of the extract, made from the fruit, was used each day for five days; the amount of sugar, being at first 7 per cent., entirely disappeared, and did not reappear for two years, a rigid diabetic diet being, however, insisted upon. In the second, a somewhat larger dose of the extract, made from the bark, was administered, and the sugar, formerly 3 per cent., entirely disappeared on the tenth day; in this case, also, the diet was prescribed. In the use of the extract made from the bark marked diuresis supervened in one instance, the specific gravity of the urine falling from 1031 to 1002. No unpleasant symptoms have been observed in the use of this remedy.—*Therapeutische Monatshefte*, 1893, Heft 4, S. 160.

[This report is in marked contrast to the failures which have been recorded by competent observers. Either the cases of diabetes have not been properly classified or the remedy is not of constant strength. It is by no means a new drug, for it is mentioned in the *Charaka-Samhita* more than a thousand years ago.—R. W. W.]

CONCERNING MERCURIAL TREATMENT.

DR. CHARLES MAURIAC believes that this remedy, in common with others which at the same time are poisonous and are of therapeutic value, must be so used that the different degrees of curative action shall be exhibited according to the circumstances of each case, and yet toxic effects, which may be even antagonistic to its therapeutic action, may be avoided. The curative principle of the remedy does not change, it matters not by what means it is introduced into the system, nor indeed in what form; the question of dose is important, and the differences in results arise only from the rapidity with which the system can be mercurialized. The rapidity of the curative action does not imply that it shall be of long duration, or that it may have some preventive power, if it is slow and gradual. On the contrary, when a syphilitic is attacked by erysipelas, or by pneumonia, or by typhoid fever, the rapidity of the disappearance of the symptoms is frequently marvellous. In

commencing treatment it is proper to place the patient upon a diet which shall aid the absorption of the remedy, and to limit to some extent the nutritive functions. From time to time purgation is proper; to supervise the diet limiting it in quantity, choosing it according to the temperament of each individual. In a considerable number of patients, especially in women, the question of tonics, reconstituents, and substantial diet will arise. The mouth and teeth should be attended to before treatment is commenced, and the digestive functions carefully examined. Above all things the renal functions should be carefully attended to, for it is by these organs that the remedy is eliminated. In all cases the treatment must be adapted to the individual, and the particular condition of that individual at different times.—*Revue gén. de Clinique et de Thérapeutique*, 1893, No. 15, p. 225.

GALLANOL.

DR. BLANC has furnished a careful review of the recent literature. Gallanol is a white crystalline body, of a slightly bitter taste, slightly soluble in cold, freely in hot water and in alcohol, also in ether, benzine, and in chloroform. The alkalis dissolve it, yielding a brown coloration, but without sensibly decomposing it. It is prepared by boiling tannin with anilin, treated with water acidulated with hydrochloric acid, from which it crystallizes and is purified by successive recrystallizations. It does not possess irritant properties. Cazeneuve and Rollet have used this remedy in psoriasis as an ointment, in strength from 3 to 25 per cent. They have not found that it gave rise to redness of the skin, nor to inflammation, nor to pigmentation. No other treatment has been so successful; the absence of poisonous properties, the fact that it ought to favor cicatrization of wounds, and its astringent effects, render this drug an important one. It apparently has value for the treatment of the eczemas, catarrhal lesions of the mucous membranes, especially in the blennorrhagias of the gouty.—*Revue de Thérapeutique Médico-chirurgicale*, 1893, No. 8, p. 214.

THE TREATMENT OF LEPRO TUBEROSA BY EUROPHEN.

DR. JULIUS GOLDSCHMIDT reports five cases treated by injections of this remedy, in 5 per cent. solutions in oil, with favorable results. The duration of the treatment was of several months, the masses becoming reduced to one-third to one-half of their original size. Increase in growth, however, followed the cessation of treatment. In making a study of pyoktanin it was found that this remedy was of no avail.—*Therapeutische Monatshefte*, 1893, Heft. 4, S. 153.

THE ACTION OF PHENOCOLL HYDROCHLORIDE IN MALARIA.

DR. GIOVANNI CUCCO, in reviewing the literature, cites the reports of Albertoni, Prati, Novi, Venturini, and Crescimanno. As the remedy is completely eliminated in twelve hours, it is important to administer it so that it shall be completely absorbed before the febrile attacks. The dose is seven grains, repeated until fifteen to twenty-two grains are taken in a day. In eighty-four cases, success followed in fifty-two; the result was doubtful in

twenty-one, and in four cases it was without effect. The remaining seven cases are of too recent observation to be conclusive. It is apparently a remedy devoid of danger, and, even in the severe cases coming under the author's observation, a successful one.—*Therapeutische Monatshefte*, 1893, Heft 4, S. 156.

The following articles are worthy of notice :

“The Physiological Action of Massage upon Metabolism.” DR. ANTON BUM, in the *Wiener medizinische Presse*, 1893, No. 1, S. 3. It has a diuretic effect, but the relationship to the excretion of the urinary solids is by no means proportional.

“Clinical and Experimental Contributions to the Treatment of Pulmonary Tuberculosis by Creasote.” DR. ALBERT ALBU, in the *Berliner klinische Wochenschrift*, 1892, No. 51, S. 300. Creasote, even in large doses, exercises no influence on tubercle bacilli and the specific tubercular process in the lungs.

“The Nutritive Value of Asparagin.” PROF. A. BALDI, in *La Riforma Medica*, 1893, No. 52, p. 616. The loss of weight of animals fed upon a diet devoid of albumin, but with the addition of asparagin, is not so great as of animals dead from inanition. But this fact does not permit the conclusion that asparagin is a perfect nitrogenous food, or that it will completely take the place of albuminoids.

“Alcohol and Digitalis.” DR. ERICH HARNACK, in the *Münchener medizinische Wochenschrift*, 1893, No. 9, S. 169. Digitalis should be used to improve the vascular tonus, and in the use of alcohol “individualisiren, nicht schematisiren.”

MEDICINE.

UNDER THE CHARGE OF

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EMPYEMA CONSEQUENT UPON ENTERIC FEVER.

WEINTRAUD (*Berliner klin. Wochenschr.*, xxx. Jahrg., No. 15, p. 346) has reported the case of a man, nineteen years old, who had had a left-sided exudative pleurisy three years previously, in which, at the close of the second week of an attack of enteric fever, slight impairment of the pulmonary percussion resonance was noted posteriorly, which was ascribed to hypostatic

congestion. Defervescence took place in the fourth week, but emaciation persisted. The temperature rose again subsequently, and the dulness on percussion at the base of the left chest posteriorly, failed to clear up, so that the existence of a pleuritic effusion was suspected. Vocal resonance was slightly enfeebled upon the lateral aspect of the left chest. Exploratory puncture disclosed the presence of pus in the left pleural cavity, in which, upon bacteriological examination, it was demonstrated that bacilli corresponding to those of enteric fever were present. In the reduced condition of the patient it was deemed best to defer operative interference. Two days after the exploratory puncture, symptoms of peritonitis (collapse, vomiting, small frequent pulse, subnormal temperature) suddenly appeared, suggesting the occurrence of rupture into the peritoneal cavity. Energetic treatment with opium was instituted, and at the end of a week the condition of the patient was much improved. The temperature was now observed to be elevated in the evening, and puncture made in the same situation as before demonstrated the presence of pus, which contained bacilli like those found in the fluid first removed, but much less virulent. Some degree of immunity to inoculation with virulent organisms was conferred upon animals treated with pus from the second puncture. The patient now entered upon convalescence, which proceeded to speedy recovery.

PULMONARY ABSCESS; INCISION; RECOVERY.

FAIRCHILD (*Chicago Clinical Review*, vol. ii., No. 23, p. 118) has reported the case of a miller, fifty-five years old, in which, after convalescence from an attack of pneumonia had apparently been established, febrile symptoms returned, with chills and cough and the expectoration of a small amount of extremely offensive matter, suggesting the existence of gangrene of the lung. Despite faithful stimulating and supporting treatment, the condition of the man grew steadily worse. The heart was found slightly displaced to the right. The pulmonary percussion resonance was found to be somewhat impaired anteriorly (it is not indicated upon which side, however) and the respiratory murmur enfeebled, while posteriorly the percussion-note was absolutely dull, and the breath-sounds could not be heard at all. Change of posture occasioned no change in the physical signs. It was concluded that a pulmonary abscess existed, and operation was determined upon. After several unsuccessful punctures the aspirating needle was introduced into the fifth intercostal space just anteriorly to the angle of the ribs, and a free flow of pus followed. With the needle as a guide, ample incision was made, and, as the ribs were too close to permit of a satisfactory entrance into the chest, the lower portion of the fifth rib was resected for a distance of about two inches. The visceral and parietal layers of the pleura were found adherent; so that after a passageway had been made by means of the fingers a dressing-forceps was introduced, the blades widely separated, and about ten ounces of pus permitted to escape. A large perforated rubber drainage-tube was introduced to the bottom of the abscess and secured to the external wound by a suture. The cavity was thoroughly irrigated with a solution of boric acid, until the fluid returned clear. Iodoform gauze was loosely packed around the tube and a generous dressing of borated gauze

applied. The patient reacted well from the anæsthetic and the operation. The dressings were for a time changed daily, the discharge of pus gradually lessening. Cough and expectoration soon ceased. At the end of a year the patient was perfectly well.

THE INFLUENCE OF CARBOHYDRATES UPON THE ELIMINATION OF NITROGEN IN DIABETES.

LEO (*Zeitschrift für klin. Medicin*, Bd. xxii., Heft 3, p. 225) reports the results of a study of the relation in diabetes between the ingestion of carbohydrates and the elimination of nitrogen. It has been shown that, in the grave cases of diabetes at least, there is increased elimination of nitrogen, dependent upon excessive disintegration of the albumin of the body. It is as a result of this process that the marked wasting takes place. The therapeutic indication is, thus, not alone to overcome the elimination of sugar but also to limit or diminish the destruction of albumin. The most important measure applicable to otherwise healthy and to some sick persons, when such excessive destruction is going on, consists in the administration of non-nitrogenous food, *i. e.*, fats and carbohydrates. This conservative action of the fats has already been demonstrated. The object of this study is to establish the relation of the carbohydrates to the destruction of albumin in the body.

It is evident that only that portion of the carbohydrates which is assimilated, *i. e.*, not excreted unchanged as sugar, can diminish the destruction of albumin. It has been shown that while starch, dextrin and dextrose increase the excretion of sugar in diabetes, the other carbohydrates, and especially the celluloses, do not, but are entirely consumed. Even the starches and dextroses are, however, not excreted entirely unused and unchanged, but are in part stored up in the system. The question remains whether or not this gain is neutralized by other processes. In this connection the influence of increased elimination of sugar upon the diuresis, and the influence of this upon the elimination of nitrogen, must be considered.

For comparative purposes it was necessary to make a study of the patient under conditions as nearly normal as possible. For a day he was, therefore, placed upon a well-adjusted ordinary diet, and for the subsequent twelve or twenty-four hours the urine as it was passed was examined as to the amounts of sugar and nitrogen that it contained. On the morning of the next day the patient was given a trial meal (consisting of 75 grammes of cane-sugar, 120 grammes of "maizena," and 50 grammes of butter, boiled with 250 grammes of water to a jelly-like mass) and nothing further until the experiment was concluded. The urine thereafter passed from hour to hour was examined as to amount and proportion of sugar and nitrogen. Analysis showed that the trial meal contained only an infinitesimal amount of nitrogen. The meal thus consisted essentially of carbohydrates, fat, and water, the carbohydrates preponderating. The butter was added for the sake of palatability.

Observations upon three healthy persons showed that the ingestion of the trial meal was followed by a variable but distinct increase in the amount of nitrogen excreted in the urine, together with the elimination of an increased amount of urine. In a case of diabetes insipidus it was found that while the

amount of urine excreted hourly was not inconsiderably increased, the hourly elimination of nitrogen was not increased correspondingly. It thus appears that in these observations the conservative action of the carbohydrates as concerns the disintegration of albumin is not appreciable—*i. e.*, it is neutralized by the increased elimination of nitrogen as a result of the increased secretion of urine.

Observations made on ten cases of diabetes mellitus showed that the ingestion of the trial meal was also soon followed by a considerable increase in the amount of nitrogen contained in the urine, in conjunction with the elimination of an increased amount of urine and increased amount of sugar. This increase was shortly followed by a diminution. Investigation showed further, that in general the increased elimination of nitrogen was more considerable in diabetics than in normal individuals, palpably as a result of the greater increase in the amount of urine secreted following upon increased diminution of sugar. It was noted that while in healthy individuals the amount of nitrogen eliminated hourly was smaller after the primary increase than during the preparatory treatment, this was the case in but three diabetics, while in six the diminution was much more tardy than in the normal. This difference may be ascribed to the protraction of the increase in the amount of urine secreted as a result of increased elimination of sugar. This relation can only be considered as of unfavorable significance. It was most evident in the graver cases.

These results demonstrate the dependence of the elimination of nitrogen upon the diuretic influence of the carbohydrates, but cannot be utilized directly to determine whether or not the administration of carbohydrates is attended with a conservation of the albumin of the body. For this purpose the observations would have to cover a longer period of time.

It has, however, been shown that the administration to a diabetic of increased amounts of carbohydrates, without change in bodily weight, is followed by a diminished elimination of nitrogen in the urine. While these observations indicate that in diabetes as much of the ingested carbohydrates as is absorbed prevents disintegration of the bodily albumin, actual demonstration is wanting, for it is not known how much nitrogen is eliminated in the stools.

To make good this deficiency two additional cases of diabetes mellitus were subjected to further study. For a number of days the patients were given a diet containing a known amount of nitrogen, and the quantity of urine, the amounts of sugar and nitrogen eliminated in twenty-four hours, as well as the amount of nitrogen in the stools, determined. After the ingestion and elimination of nitrogen became equal, the actual experiment was begun. Then, known quantities of "maizena" and sugar, made with water into a gelatinous mass, were additionally given; and the elimination of nitrogen was compared with that of the previous days. It was found that while the amount of urine secreted was increased, the amount of nitrogen excreted in urine and stools was not correspondingly increased. The results of these observations showed that the administration of carbohydrates to diabetics was attended with a lessening of albumin-metabolism.

The importance of these investigations in their bearing upon the treatment of diabetes must be evident. While it may not be possible in every case to

have the amount of nitrogen eliminated determined, important indications may be gained from a knowledge of the body weight and the amount of urine excreted, in addition to a knowledge of the amount of sugar excreted.

A CASE OF CONGENITAL CIRRHOSIS OF THE LIVER.

NEUMANN (*Berliner klin. Wochenschr.*, Jahrg. xxx., No. 19, p. 445) has reported the case of a child that was noticed to be jaundiced on the day after birth. It was restless, cried a good deal, and took little nourishment. The stools were thin, frequent, and grayish-white in color. For a short time there was a slight increase in weight, but this was subsequently followed by a loss. The urine was free from albumin and sugar, but contained biliary coloring matter. On physical examination the liver was found to be considerably and the spleen slightly but distinctly enlarged. The family history pointed to the existence of syphilis, and a diagnosis of congenital occlusion of the biliary passages was arrived at. The child died, when almost four months old, of an attack of pneumonia. Upon post-mortem examination, in addition to icterus, enlargement of the liver and spleen, and pleuro-pneumonia, the gall-bladder was found to be small and containing no bile. The cystic and common choledoch ducts were patulous. On section, the structure of the liver was firm and slightly granular; no bile and no ducts could be seen. The acini were dark-green and separated by small grayish-white bands of connective tissue; in some places the outlines of the acini were destroyed. Microscopically, the acini were found to be diminished in size. Flakes of pigment lay between the hepatic cells. There was no diffuse infiltration within the acini. The interacinous connective tissue was greatly increased, and was constituted of embryonal tissue in which connective-tissue cells could still be seen. Within the connective tissue there was evident hyperplasia of the biliary capillaries. There were also pigment granules in the connective tissue. These changes were present in those parts of the liver in which to the naked eye the outlines of the acini were indistinct. In the slightly increased interacinous connective tissue considerable cellular infiltration was present.

TUBERCULOSIS OF THE SKIN IN CONJUNCTION WITH TUBERCULOSIS OF THE LARYNX.

KÖBNER (*Berliner klin. Wochenschr.*, Jahrg. xxx., No. 19, p. 444) has reported the case of a man, forty-three years old, who presented, an inch below the margin of the lower jaw to the right of the median line, an ulcer, of circular outline, about as large as a silver dollar, the base of which was grayish and covered in part by crusts and in part by granulations. The margins of the ulcer were flat, slightly livid, but little infiltrated, not undermined, but uneven, and marked by numerous nodules, ranging in size from a millet-seed to the head of a pin. The adjacent lymph glands were enlarged. On laryngoscopic examination, intense perichondritis of the epiglottis and arytenoids was found, with extensive ulceration of the vocal bands. Examination of sections of a portion of tissue removed from the neck disclosed the presence of tubercle bacilli and the histologic appearances of a tuberculous process.

There was no family history of tuberculosis, but ten years previously the man had lost his wife (after having been married for ten years) from tuberculosis. Three years later he was seized with hoarseness and sore-throat and was treated for tuberculosis of the larynx and lungs. He was then fairly well for four years, when he noticed a small area of ulceration below the jaw. The ulcer progressively increased in size and the man again became hoarse. There was no history of syphilis, but the man was for a considerable period of time treated actively with potassium iodide and mercury. Instead of improving, his condition continued to grow worse, until he became markedly anæmic, highly emaciated, and entirely aphonic. Locally, iodoform was dusted upon the ulcerated area, but the prognosis was considered highly unfavorable.

BRONCHIECTASIS SUCCESSFULLY TREATED BY PNEUMOTOMY.

HOFMOKL (*Wiener medicin. Presse*, Jahrg. xxxiv., No. 18, p. 681) has reported the case of a man, forty-three years old, who for five weeks had complained of slight pain in the right side of the chest, with cough that was most marked at night. There was moderate expectoration, the ejected matters as well as the breath after a short time having a most offensive odor. There was also slight febrile movement. The appetite was impaired, sleep was disturbed, emaciation was apparent. The chest was short, but broad and well arched. Respiration was short, quiet, rhythmical, and principally abdominal. The chest was a little flatter anteriorly and posteriorly on the right than on the left. The respiratory movement appeared to be symmetrical. Vocal fremitus was a little less distinct on the right anteriorly than on the left. The percussion resonance was sonorous on the right side above the clavicle; over the clavicle there was absolute dulness; in the first, second, and third intercostal spaces the resonance was almost entirely wanting, becoming manifest again externally at the mammillary line. Elsewhere the percussion sounds were normal. On auscultation the respiratory murmur was found to be vesicular in the right supra-clavicular fossa; of bronchial character in the first and second interspaces near the sternum; elsewhere in the area of impaired resonance indefinite and vesicular. Whispering pectoriloquy could be elicited between the first and second ribs. Isolated dry râles were audible in the area of dulness. The amount of expectoration increased, but no tubercle bacilli could be found in the sputum. A solution of methyl-violet injected into the second interspace at once appeared in the sputum. Bronchiectasis was diagnosticated, and, ordinary medicinal measures failing to bring relief, pneumotomy was determined upon. The patient being chloroformed, an incision about three and one-half inches long was made in the second intercostal space. With the point of the actual cautery at red heat, the lung was entered through the thickened and adherent layers of the pleura. Less than a drachm of putrid, offensive pus escaped. There was no escape of air. A sound passed a distance of a little more than an inch into the depth of the lung. The hemorrhage was insignificant. The wound was drained, packed with gauze, and covered with a protective dressing. The expectoration at once diminished decidedly, and the sputum in a short time

lost its offensive odor. In the course of the treatment, air was on coughing expelled through the opening. There was progressive improvement in both the local and the general condition, until recovery ensued.

SURGERY.

UNDER THE CHARGE OF

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TOTAL EXTIRPATION OF POPLITEAL ANEURISMS.

MEINHARD SCHMIDT advocates, in the *Archiv für klinische Chirurgie*, 1893, Bd. xxiv., Heft 4, the extirpation of popliteal aneurisms. The aneurism is to be removed exactly as if it were a tumor. The advantages over the Antylléan method, which is the next most radical, is that no unnecessary part of the diseased vessel is left behind, which might become the seat of suppurative processes.

In the forearms and legs, where there are two main vessels of supply, and the chance for a good collateral circulation is very favorable, the radical method is the operation of choice.

The author details a case in which he excised a popliteal aneurism from each leg of a patient. The most tedious part of the operation, in nearly every case, is the separation of the vein from the artery. The integrity of the vein should be maintained if it is possible.

The author prefers packing and secondary sutures, to be tied in forty-eight hours.

In the twelve cases collected by the author (including his own), the results have been very favorable. Gangrene did not occur; even an accidental cut of the vein had no unfavorable influence upon the establishment of collateral circulation.

ON THE TREATMENT OF SPINAL ABSCESS.

WATSON CHEYNE, in an address before the British Medical Association (*British Medical Journal*, 1892, No. 1670), briefly reviews the older methods of operating, and speaks in considerable detail of the modern antiseptic methods. It is well known that the opening of these abscesses in the pre-antiseptic period was almost surely followed by profuse suppuration, rapid wasting of the patient, and frequently death. As a consequence, at that time surgeons unanimously advised against operation.

Lannelongue asserts, basing his conclusion on post-mortem evidences, that even in those cases of vertebral disease without visible abscess, a focus of caseation is usually present.

Twenty or thirty years ago, therefore, the best method of operating in cases of spinal abscess was aspiration by means of a trocar. The author, in 1888, collected fifty-eight cases which had been thus operated upon either by Sir Joseph Lister or himself. Of these, forty-nine remained aseptic throughout. Thirty-eight, or $77\frac{1}{2}$ per cent., were cured at the time that the statistics were compiled. These were advancing toward cure, and five had died of tuberculosis or other causes than the abscess.

The treatment by drainage has, however, certain disadvantages. The wound requires a long period for healing; the average length of time in the cases quoted was between eight and nine months, the shortest period being two months, and the longest from two to three years.

The true pathology of these chronic abscesses is now conceded to be a tuberculous tumor with a softened centre, so that by simply opening and draining, the essential part of the disease remains untouched. The author has previously pointed out, in his lectures at the Royal College of Surgeons, three ways in which these abscess walls may be dealt with.

Excision. The most radical and satisfactory method is to dissect out the swelling without opening it, as if it were a cyst. This is applicable to many cases. For example, to many glandular abscesses, to the subcutaneous tuberculous nodules of children (gommes scrofuleuses), to many abscesses. Where this is done a clean-cut wound is left, which heals by first intention.

Piecemeal removal of the wall. If the abscess is too large, or its connections such that it cannot be dissected out in this way, the next best thing is to lay it freely open, so as to see its interior, and then remove the wall by clipping, cutting, etc. This is possible in a good many cases of abscesses in the extremities, and also elsewhere, and in this way we can generally get a healthy wound which heals by first intention.

Scraping. Either of these methods failing, we can still get rid of the greater part of the wall by making a smaller incision into the abscess, scraping away the wall with a Volkmann's spoon, or rubbing off the degenerating tissue by means of rough sponges, etc.

The way in which it has been carried out in most instances is, shortly, as follows: The necessary antiseptic precautions are, of course, taken, and a small incision is made into the abscess, somewhat larger than can admit the finger, which is then introduced and the cavity thoroughly explored. The surface of the abscess cavity is then gently scraped with a Volkmann's spoon, preferably a flushing-spoon, on the principle introduced by Mr. Barker, free exit being permitted to the fluid, and the finger being inserted from time to time to guide the spoon. Where the use of the spoon is dangerous—as toward the peritoneum or along a large vein, a good deal of the degenerating material can be removed by rubbing the surface with a piece of coarse sponge. If any loose pieces of bone is felt it should be removed, and the carious surface of the bone scraped if it can be got at. At the same time the cavity is thoroughly flushed out with warm (1:10,000) sublimate solution, and when it is thoroughly clean the fluid is squeezed out; one to two ounces of a 10 per cent. emulsion of iodoform in glycerin, containing a small proportion of

bichloride of mercury, is introduced, and the external wound, and also the wound in the muscles, if present, is stitched up.

Of twenty-four cases treated in this manner, thirteen healed by first intention. They were sent out in a suitable apparatus, and with apparently no recurrence. Eleven of these remained well, but two came back some months later with sinuses. Of the remaining eleven cases the greater part of the wound healed by first intention in seven instances, small sinuses only remaining at some part. These were healed without difficulty by mild measures. Nineteen of the cases were thus cured, either at once or after a second operation. The best method of treating chronic abscess, namely, the complete removal of the disease by dissection, is applicable only in very rare instances. Practically, only in those in which the disease affects the posterior or lateral parts of the vertebræ.

THE ACCIDENTS WHICH MAY FOLLOW REMOVAL OF PORTIONS OF THE OMENTUM IN OPERATIONS FOR HERNIA.

BULL, under this heading, describes (*Annals of Surgery*, 1893, No. 3) some of the accidents which follow operations in which ligature of the omentum and excision are necessary.

The author has met with but a single case of hemorrhage from the omental stump, but he records a number of instances in which the stump became the seat of inflammation some time after the operation. Some of these cases underwent spontaneous resolution, while others went on to abscess formation, and thus demanded a second operation. The symptoms of the inflammatory process in the stump did not appear until from three to four weeks after the operation in the majority of the cases reported. The usual symptoms were a tender, immovable, and hard tumor, associated with local pain, rise of temperature, and vomiting. The author has invariably used silk ligatures in the past, but expresses his intention to return to the catgut ligature. He is inclined to look for the cause either in the ligatures used or some fault in the asepsis. A case is referred to in which death from perforative ulceration followed the inclusion of a small portion of the bowel wall in the omental ligature.

The article concludes as follows: In dealing with the omentum the following dangers are to be borne in mind: 1. Bleeding from inefficient ligature. 2. Damage to neighboring intestine from faulty application of the ligature. 3. Inflammation and abscess of the omental stump. These dangers should make the management of the omentum the subject of special care. Any threatened inflammation should be met by prompt excision as soon as symptoms are urgent.

GRADUAL AUTO-INOCULATION AS A FACTOR IN THE PRODUCTION OF IMMUNITY FROM SEPTIC INFECTION.

BINNIE calls attention (*Annals of Surgery*, 1893, No. 3) to the difference, in their clinical course, between those cases of appendicitis in which there has been perforation or gangrene of the process, and which run a rapidly fatal course, and the cases in which, after the existence of pyosalpinx for a long time, the tube suddenly ruptures and the fetid contents are poured out

into the general peritoneal cavity. The latter almost invariably recover after simple excision and drainage.

This difference the author believes to be due to an acquired immunity in the latter affection, due to the presence of the pus in the body for a long time. The researches of Reichel seem to sustain this view. This author was able to produce immunity in animals against pyogenic micro-organisms by administering gradually increasing doses of pure cultures. Reichel reaches the following conclusion: "These experiments, in my opinion, undoubtedly prove that the immunity against the virus of pyogenic micrococci attained by the methods described is an immunity of the whole organism. In other words, that this immunity not only enables the nerve centres and the heart to withstand the noxious poison of infection, not only diminishes or destroys the susceptibility of the peritoneum to its irritation, but that it increases the power of every tissue, even of the subcutaneous fatty tissues, to resist the phlogogenic properties of the cocci.

THE TREATMENT OF FRACTURES OF THE NOSE.

WALKER DOWNIE (*Glasgow Medical Journal*, 1893, No. 3) contributes an interesting article on fractures of the nose.

Although these injuries follow a variety of causes, the violence is always of a direct character. The nasal bones, from their prominent position, suffer most frequently from injuries of this region. The cartilaginous septum, in the author's experience, is seldom fractured, but is frequently dislocated. More rarely the lachrymal bone, the nasal process of the superior maxilla, the vomer, and the central plate of the ethmoid, may be involved. In all cases of fracture there is more or less laceration of the overlying mucous membrane, accompanied with more or less hemorrhage.

The amount of deformity will depend on the amount of swelling and ecchymosis which follows the injury. The septum may be considerably dislocated laterally without appreciably altering the contour of the nose.

When this structure is fractured, however, or dislocated backward, a characteristic depression will be seen immediately beyond the extremities of the nasal bones. The nasal bones themselves, when broken, may be displaced backward or to either side. If the lachrymal bones are implicated, emphysema of the eyelids and cellular tissue of the orbit is apt to follow.

The treatment of these cases should consist in arresting the hemorrhage, restoring the parts to their normal condition, and the application of proper means of retention. The bleeding is best controlled by plugging the nares, and as the posterior nares are never involved they need not be packed. After a single fracture the displacement does not tend to recur after the parts have been restored, but in the cases in which there has been comminution some means of retention after reduction is necessary. The method so often recommended, of plugging the nose after introducing a catheter, followed by the application of pads of lint applied to the nose externally and retained by adhesive plaster, is condemned, on account of being both unsurgical and disappointing in results.

The author prefers to use the leaden mask, in conjunction with intra-nasal splints made of the same material. After reduction the intra-nasal splint is

applied. This somewhat resembles an almond in shape, and is furnished with a wing on either side at the broadest part. The flat portion lies in contact with the septal cartilage, and the curved wings lie against the inferior turbinated body.

The external splint is then fitted; it consists of a single piece of sheet lead, the nose-piece of which is prolonged over the alæ and on to the cheeks to give support; the upper part is continued on to the forehead. The whole is covered with a layer of silk or linen fabric fixed to its surface by means of paste. In dealing with old fractures the parts involved must be very thoroughly broken up, after which they can be moulded at will.

The intra-nasal splints may be removed at the end of four days, and the external splint in six days. Either, or both, may be reapplied if necessary. For controlling moderate hemorrhage, a 5 per cent. solution of antipyrine is recommended.

ENTERO-ANASTOMOSIS AS A SUBSTITUTE FOR CIRCULAR SUTURE.

BRAUN describes (in the *Archiv für klin. Chirurgie*, 1893, Bd. xxiv., Heft 2) his method of performing intestinal anastomosis. After resection of the bowel the two ends are inverted and a double row of sutures applied. The coils to be united are laid side by side, the closed ends pointing in opposite directions. This, the author considers a distinct advantage over Senn's method, in which the cut ends have the same direction, as, in the latter method, the peristaltic movements have a tendency to force the contents of the bowel against the sutured end. The slight torsion of the mesentery, which unavoidably occurs in Braun's operation, does not exert any unfavorable influence. After the ends of the bowel have been placed in their proper positions they are united by superficial sutures, which include the serous and a part of the muscular coat, the length corresponding to the length of the intended opening—5 to 9 centimetres. Care must be taken not to penetrate the lumen. The blind ends, which should be short, are secured to the adjacent intestine in order to prevent invagination. The next step is to make a cut 4 to 8 centimetres long through the serous and muscular coats down to the submucous coat. The cut is easily made, and permits of the passing of the silk sutures in the posterior margins of the incision with ease and safety. The mucous membrane is next incised, and the redundant edges are removed; the posterior margins, and then the anterior margins, are united with a continuous catgut suture. Finally, the anterior margins of the serous and muscular coats are united with a row of silk sutures, and a few stitches are passed at the extremities of the two rows of sutures.

The time required for the establishment of the actual fistula was from fifteen to twenty-five minutes, and the number of silk sutures employed varied from thirty-four to fifty-four. The author reports ten cases operated on by this method, with five recoveries and five deaths.

THE EXTIRPATION OF BRAIN TUMORS.

V. BRAMANN contributes a very interesting article on this subject in the *Archiv für klinische Chirurgie*, 1893, Bd. xlv., Heft 2. Two cases are reported. The first patient was a peasant, aged forty-six years. A year and a half

previously to applying at the hospital he had received a blow on the head. He complained of headache; the left side of the face and left arm were paralyzed, and there was marked weakness of the muscles of the left leg. The reflexes of the affected side were exaggerated, and ankle clonus was present. Hearing and vision were impaired on the affected side. At this time the fundus of the eye appeared normal, although later choked disk of a light degree developed. The patient had frequent attacks of clonic spasms, beginning in the flexors of the left hand and ascending until the arm, shoulder, and left side of the face were involved. Consciousness was preserved during these attacks. During the spasm there was conjugate deviation of the eyes to the left.

The localized paralysis and spasms were thought to be due to a tumor of the brain, which was probably a large one, involving the posterior (movement of fingers) as well as the anterior central convolutions.

The convulsions gradually became more frequent, the pains in the head increased. On one occasion the patient had a syncopal attack, with nausea, vomiting, and slowing of the pulse. Operation was finally decided upon and performed after Wagner's method of temporary osteoplastic resection. The soft parts having been turned up as a tongue-shaped flap, the bone was chiselled through in the line of the incision in the soft parts, and its base broken by means of aspiratories pushed along under the surface, and the flap laid back. After removal of the thickened dura, a cystic, fluctuating mass, feebly pulsating, was discovered. It was apparently distinct from the adjacent brain-substance, nevertheless a portion of the cerebral matter was removed as well as the growth. A drainage-tube was wrapped in iodoform gauze and inserted into the cavity, and an antiseptic dressing applied.

Although the wound healed satisfactorily, the patient was not benefited by the operation, and within two weeks convulsions similar to those before described returned. The drainage-track became surrounded by unhealthy granulations, and the part became prominent. The tumor was found to be a myxosarcoma, and the return of the convulsions was ascribed to a recurrence of the growth. A second operation was no more successful than the first. Finally, a third attempt was made to relieve the patient; this time a considerable portion of brain-substance surrounding the growth was removed. The cavity was four to six centimetres deep and as large round as a saucer. The result was eminently satisfactory. Two months after the last operation the patient was able to leave the bed, the choked disk had disappeared, power had returned in the paralyzed leg, the hand and forearm alone having failed to improve. A month later there were no signs of return of the disease. Sarcomata of the brain seem less prone to give metastasis than when these tumors are found in other portions of the body.

A second case was that of an artist who had received a blow on the right side of the head a year before coming to the hospital. At this time he had choked disks, most marked on the right side; diminution of the field of vision, particularly of the right; left-sided facial paralysis; paresis of left arm, and to a less extent of the left leg; also slight loss of power in the right leg. The reflexes were increased on both sides, but were most marked on the left. After being under observation for a week an edematous swelling appeared on the right side of the head. A few days later the patient had a convulsion

affecting the left side of the face and the left arm and leg. The diagnosis lay between abscess and tumor. The choked disks, the absence of symptoms of meningeal irritation, of vomiting, of hebetude, of fever, and of anorexia favored the latter condition.

An operation was performed, when a neoplasm of the brain was removed which weighed two hundred and eighty grammes. A large part of the longitudinal fissure, and even the cribriform plate of the ethmoid bone, were exposed after the removal of the tumor. In order to equalize the intra-cranial pressure and prevent œdema of the brain, the cavity was firmly packed with sterilized iodoform gauze. Convalescence was tedious, but recovery finally took place. The choked disks disappeared, but the power in the limbs was only partially regained. The tumor proved to be a mixed spindle- and round-celled sarcoma.

The author devotes considerable space to a discussion of papillitis. This condition is almost invariably present in cerebellar tumors. Neoplasms in the frontal, parietal, and temporal regions cause a milder grade of the same condition. These variations are explained on anatomical grounds. The venous blood of the fundus is carried by the posterior and short ciliary veins directly into the cavernous sinus, or into the superior ophthalmic veins. The latter empty principally into the cavernous sinus; a portion of the blood, however, is delivered into the anterior facial vein. Any interference with the return circulation, either by pressure upon the vein accompanying the optic nerve or on the sinus itself, will give rise to a venous hyperæmia of the disk.

The sinus is so well protected in its membranous envelope that a great increase in the intra-cranial pressure, or a force acting almost perpendicularly from above downward, as a tumor of the base, is necessary to cause sufficient pressure to give rise to symptoms. An increase of pressure is noted much earlier, however, by the veins accompanying the optic nerve, which lack the complete protection of the dura, and, moreover, rest directly on the base of the skull. Hence, the choked disk in tumors of the cerebrum, especially in those situated near the convexity, is due primarily to compression of these veins; secondarily, to compression of the sinus. The stasis produced by even a remote tumor is naturally more intense the nearer the base of the brain the new growth is situated, and reaches its highest degree when a direct compression of the veins at their point of entrance into the sinus exists. Tumors in the median line, or very large growths, produce bilateral choked disk. In such cases the localization of the growth is very difficult, as the same condition is produced by cerebellar tumors. According to the author, an important point in the differential diagnosis is the presence of hemorrhage and ecchymoses in the retina and choroid. These are only met with in tumors near the base of the frontal lobe, and are never seen in cerebellar growths, no matter how advanced.

The author also offers an explanation of the choked disk occurring in tumors of the cerebellum, and in other affections of the posterior fossa of the skull. The blood from the orbit and bulb flows into the cavernous sinus, thence into the superior and inferior petrosal sinuses. The first, running along a groove in the petrous portion of the temporal bone, empties into the lateral sinus at a point where the latter emerges from the tentorium. The second flows backward toward the jugular foramen; a third, but inconstant

channel, the basilar plexus of Virchow, carries the blood to the anterior spinal plexus. The inferior petrosal and the basilar plexuses lie in shallow bony grooves, and hence are easily compressible. The lateral sinus in that part of its extent occupying the sigmoid fossa of the temporal bone, is less resistant than the portion in the tentorium, which membrane separates more or less completely the posterior from the middle and anterior fossæ of the skull. A tumor or an abscess developing beneath the tentorium, even if small, will produce a more marked increase of pressure than similar affections of the hemisphere. This rise of pressure extends to the brain and its membrane, to the lateral sinus, as well as the other two feebly protected channels. The first result is a stasis in the cavernous sinus, which soon leads to stagnation in the fundus. Tumors of the occipital lobes, by downward pressure on the tentorium, also produce choked disk—as in nearly all cases of tumors of the hemispheres, more marked on one side. Affections of the temporal lobes are very variable in respect to the production of choked disk, and it has been generally supposed that this condition is very rare. Excluding the more common disease of this region—namely, abscess following middle-ear disease—we will find that choked disk is by no means rare, but is not as marked as would be expected from the proximity to the cavernous sinus. The explanation of this condition is found in the fact that the cavernous sinus is exceedingly well protected against lateral pressure both by the enclosing dura and more efficiently by the processes of the tentorium attached to the anterior and posterior clinoidal prominences. The more anterior a tumor of the temporal region is situated, the more marked will be the difference in the stasis in the two eyes. If the tumor is located at the base of the third frontal convolution, compressing the optic tract and its vessels, then we shall have choked disk of the corresponding eye only. It is a fact that the degree of the choked disk does not depend so much upon the size of the tumor as upon its structure and mode of growth. Circumscribed tumors produce more marked symptoms than abscesses and diffused growths, which form at the expense of the brain mass.

In regard to the technique of cerebral surgery the author dwells upon the importance of checking all hemorrhage. Compression with sterile gauze during the operation, and with an iodoform tampon afterward, is of the utmost importance in preventing oedema. Large cavities should not be packed with iodoform gauze exclusively, as there is danger of intoxication. Opening of the skull simply to relieve pressure is condemned by the author.

PERFORATING CARCINOMA OF THE SCALP.

BRAUN (*Archiv für klin. Chir.*, 1892, Bd. xlv., Heft 1) reports a case of cancer of the scalp, originating from scar tissue, in a child twelve years old, and growing rapidly until the fourteenth year, when it came under his observation. It was then ulcerated and pulsating. He decided to remove it in successive operations, disinfecting the wound as much as possible before removing the inner portion of the growth, and waiting to close the external wound until the inner portion had healed without any sign of return *in situ*. The operation showed that the growth involved not only the skin, but the bone, dura and pia mater, and the brain substance itself. These diseased

portions were removed in the successive operations, fine needles with catgut sutures being passed under the arteries of the pia mater and then the ligatures tied, while the diseased portion of the brain substance was removed by the knife or the actual cautery. After the removal of one return of disease *in situ*, the wound was closed by an osteo-plastic operation, six months after the last sign of recurrence. The patient made a complete recovery with no symptoms of further disease.

CHOLEDOCHOSTOMY.

TERRIER (*Rev. de Chir.*, Fév. 1893), after defining this operation as the permanent opening of the ductus choledochus, gives a critical and detailed study of the only four cases which have been operated upon. None of these were premeditated operations, nor was the true nature of the tumor diagnosed, except in one case, before the autopsy, and in this case the report is so meagre that it is impossible to determine the surgeon's reason for the establishment of the fistula, or the condition found present in the choledochus. The author concludes from the cases studied, that the enormous dilatation of the ductus choledochus appears to accompany frequently the infection of the biliary passages, which complicates in all cases any operation and renders it very grave. As a consequence of the rarity of cases in which this operation is justified and in which it has been performed, it is impossible to formulate rules of procedure until other observations, with the results of intervention, have been published.

THE TREATMENT OF TUBERCULOUS JOINTS WITH IODOFORM OIL.

THE *Centralblatt für Chirurgie*, 1893, No. 3, reviews the monograph of DE VOS on this subject. The work embraces the results obtained at the clinic and polyclinic at Leyden, covering a period of a year and a half. The iodoform was prepared in the following manner: Ten grammes of the powder were placed in a black glass bottle and covered with a solution of corrosive sublimate 1:1000, which was allowed to remain four days; the fluid was then decanted and the iodoform washed repeatedly with fresh distilled and boiled water; to this aseptic iodoform was added 100 grammes of olive oil which had been previously boiled ten minutes and cooled down to 30° C., and repeatedly shaken.

For injections into the hip-joint the author recommends that the needle should be fourteen centimetres long; when the injection is made into bone the needle is provided with a stylet. After experimenting on cadavers the author recommends the following methods for injecting the different joints. For the shoulder-joint: adduction of the arm, with the forearm bent at a right angle across the body; the needle is entered one centimetre behind and below the point of the acromion. For the elbow: a point is selected external to the olecranon, the needle being entered between the head and tuberosity of the radius. The wrist: the point of election is, on the radial side, the most dorsal corner of the tabatière; on the ulnar side, a place on the upper anterior course of the pisiform bone. For the hip, the author's method is as follows: the mid-point between the anterior superior spine of the ilium and the tuberosity of the pubes is designated; from a point the breadth of the patient's thumb

external to this a line is drawn downward to the external point of the trochanter major; this last line is divided into four equal parts; the first dividing-point from the trochanter is the point at which the needle is to be entered. It is necessary that the limb should be straight and the inner border of the foot should be vertical. If the position of the trochanter is out of the Roser-Nélaton line the needle must be carried a corresponding distance in the same direction. For the knee: at the point between the upper end of the tibia and the ligamentum patellæ. For the ankle: on the outside of the foot closely anterior to the point of the malleolus in a direction toward the calcaneum.

It is recommended to make the injections slowly, occupying about ten minutes for the introduction of 10 grammes. For adults, 1 gramme of iodoform may be used with safety. If no reaction appears, the second injection is to be made in eight days. The intervals may gradually be made longer.

Massage and passive movements are not to be used after the injections, as this might produce iodoform intoxication or disseminate the tubercular infection. Moderate active movements are recommended. Some of the symptoms of iodoform intoxication are dimness of vision, retinal hemorrhages, and a papular retinitis. The author considers iodoform oil better than the glycerin mixture for theoretical reasons. Of the cases reported, the duration of treatment varied between 9 and 325 days; the number of injections from one to twenty; the amount of iodoform used in a case from 2 to 67½ grammes; the amount of oil used from 10 to 385 grammes. Result, 72 per cent. entirely cured. Of the 68 cases, 60 were clearly joint tuberculosis. Only 2 cases of recurrence were observed.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,
OF PHILADELPHIA.

ŒSOPHAGOSCOPY.

DR. LUDWIG LÖWE, of Berlin, describes (*Deutsche med. Wochenschr.*, 1893, No. 12) a method of œsophagoscopy which he has devised, differing from the various methods practised by Semeleder, Stoerk, Waldenberg, Morell Mackenzie, and Mikulicz. The œsophagoscope and the images rendered are illustrated by cuts, to which the reader must be referred for intelligible details.

ABSCESS AT THE BASE OF THE TONGUE.

AN instance of this rare lesion is reported (*Annales des Mal. de l'Oreille, etc.*, 1892, No. 12) by L. HÉLARY from the service of Prof. Gouguenheim.

It was attributed to apparent injury from a morsel of bone during glutition. Topical pain, dysphagia, pronounced fever, difficult respiration, and swelling on the left side of the neck ensued. Laryngoscopic inspection revealed a small tumor on the left side of the base of the tongue, extending to the central portion and concealing the glosso-epiglottic fossa. While preparations were being made to incise the abscess it underwent spontaneous rupture with discharge of about a quarter of a tumblerful of fetid sanious pus. Immediate relief followed with prompt subsidence of all symptoms.

SYPHILIS OF THE LYMPHOID NODULES AT THE BASE OF THE TONGUE.

THE lymphoid nodules in the base of the tongue, inelegantly termed lingual tonsils and fourth tonsils by writers on diseases of the throat, have been made a special subject of study in cases of syphilis by DR. SEIFERT, Würzburg (*Münch. med. Wochenschr.*, 1893, No. 6), who finds that they are frequently diseased in secondary, tertiary, and hereditary syphilis. His statistics show that they are involved in the majority of cases of constitutional syphilis affecting the pharynx, and especially the true tonsils. First, there is congestion and tumefaction, then development of papules, and, finally, ulcerous destruction of these papules. There are no subjective symptoms in the first stage, and but little in the second stage, while the ulceration in the third stage produces marked dysphagia.

THE RHINOMETER.

DR. EDWARD BLAKE (*Journ. of Lar.*, 1893, No. 3) describes a thin graduated spatula for use in probing the nasal passages, and he claims that it serves to diagnose rapidly the various obstructive diseases of the naso-pharynx.

THE CONDITION OF THE NOSE IN TYPHOID FEVER.

THIS is another of DR. PAUL TISSIER's admirable original contributions (*Annales des Mal. de l'Oreille, etc.*, 1893, No. 3) to clinical science. The result of eight detailed observations are summed up as dryness, anæmia, and necrosis of the mucous membrane during the periods of invasion and activity, with return of secretion and vascularization at the approach of convalescence. Superficial erosions at the anterior portion of the septum constitute the anatomic substratum of the epistaxis.

SECONDARY SYPHILIS OF THE NASAL PASSAGES.

DR. PAUL TISSIER (*Annales des Mal. de l'Oreille, etc.*, 1893, No. 2) reports a series of twenty-five observations recently made in females with secondary manifestations in the skin or in the mucous membranes. The results are summed up as vermilion-colored erythema, followed by erosions, and the possible production of synechiæ between the septum and the turbinate bodies. He emphasizes the necessity of distinguishing the secondary manifestations of acquired syphilis from the coryza so often observed in the precocious form of hereditary syphilis in the newborn subject.

MORBID GROWTHS IN THE NASAL PASSAGES.

DR. ROBERT DREYFUS, of Strasburg (*Wien. med. Presse*, 1892, No. 36), reports an instance of carcinoma in the nasal passages of a woman sixty-four years of age, who had suffered some thirty years with copious purulent nasal catarrh. Fetid secretions were discovered in both nasal passages, and a number of smooth red tumors, the size of peas, in the right middle meatus in the region of the *hiatus semilunaris*. The patient had for a long time been unable to open the mouth beyond a limited extent, so that posterior rhinoscopy and palpation of the rhino-pharynx were impracticable. For some time there had been pains in the right frontal and occipital regions. These growths were removed, and dead bone was curetted from the ethmoidal, sphenoidal, and frontal sinuses. Anæsthesia of the right side of the jaw, of the cheek, and of the lips soon ensued. Other masses were removed from the roof of the nasal passages, and new growths became developed on the floor of the nose. The general condition became worse, with deafness and diminished vision of the left eye, with congestion of the conjunctiva and dilatation of the pupil, indicating that the tumor had perforated the uppermost portion of the septum and pressed upon the optic nerve of the opposite side, as was demonstrated by the physical exploration and injection. Symptoms of purulent meningitis, with almost continuous fever, became manifest, and the patient died after a comatose condition lasting eight days. An autopsy could not be obtained. In all probability, the carcinoma originated in the nasal mucous membrane in the region of the ethmoid bone, whence it perforated the bones and extended into the cavity of the cranium.

MM. B. LYONNET and C. REGAUD (*Annales des Mal. de l'Oreille, etc.*) report a case of carcinomatous growth in the rhino-pharynx of a man thirty-seven years of age, which invaded the sphenoid bone, produced paralysis of all the cranial nerves of the left side, except the olfactory and optic, and terminated fatally by meningitis.

ELECTRIC ILLUMINATION IN ABSCESS OF THE MAXILLARY SINUS.

DR. J. GAREL (*Annales des Mal. de l'Oreille, etc.*, 1893, No. 2) describes a complementary diagnostic sign of the presence of fluid or other substance in the sinus, in the absence of the perception of light on the affected side at each making of contact when the eyes are closed.

THE ANATOMICAL RELATIONS OF THE FRONTAL SINUS AND ITS ORIFICE.

DR. A. HARTMANN, of Berlin (*Wien. med. Presse*, 1892, 36), contends that there is no regular naso-frontal canal, but that the frontal sinus extends as far as the anterior end of the middle turbinate bone, and opens freely through a wide fissure into the outer portion of the nasal meatus. Usually the portion lying beneath the turbinate bone is narrowed by ethmoidal cells which may project from all its walls. These cells leave a median space free, which may be designated as the *ductus naso-frontalis*. It opens, as a rule, in the anterior

furrow of the *infundibulum*, and thus permits the passage of a properly bent probe into the sinus when access is free from the middle meatus. This access may be rendered difficult—1, by various distentions of the anterior ethmoidal cells; 2, by great development, coiling, or cavernous formations in the middle turbinate; 3, by immoderate prominence of the *processus uncinatus*; 4, by great prominence of a *bullæ ethmoidalis*, which fills the *infundibulum*, and may thus wholly cover the orifice. Despite these numerous hindrances, the frontal sinus may be probed in nearly 50 per cent. of all cases. In most cases of abscess of the frontal sinus, cure may be effected by syringing or removing obstructions to the natural flow of the secretions without any necessity for opening the sinus from the exterior.

INJUDICIOUS TREATMENT OF THE NOSE AND THROAT AS A SOURCE OF DISEASE IN THE MIDDLE EAR.

DR. THOMAS BARR, of Glasgow (*The Lancet*, 1892, No. 3616) discusses the injurious results of improper recourse to nasal irrigations, incandescent and other cauterizations, with citations of injuries recorded by various observers; he concludes with some precautionary suggestions as to the methods to be pursued when such procedures are practised.

[This article is worthy the commendation of all specialists in affections of the nose and throat, and would be the means of saving hundreds, if not thousands, of sufferers from injury, if learned by heart by specialists who know little of general medicine.]

Even judicious treatment is occasionally followed by similar misfortune. Thus DR. WM. C. BRAISLIN, of Brooklyn (*New York Medical Journal*, 1898, No. 744) reports a unique case of purulent otitis media following amputation of the uvula of a tuberculous subject. While it is intimated that the removal of the uvula was the direct source of the otitis media, which followed so closely as to make it seem probable that the disorder would not have occurred had no operation been performed, the possibility of infection by the engorgement of sputa in the Eustachian tube is acknowledged, the more probable as the suppuration in the ear was tuberculous in character.

CARDIAC IRREGULARITY IN RHINO-PHARYNGEAL DISEASE.

In a paper upon "Irregular Heart," DR. SANSOM (*The Lancet*, 1892, No. 3616) presented some illustrative cases tending to show that a reflex from the rhino-pharyngeal tract and from the neighborhood of the auditory mechanism was often a potent cause of cardiac irregularity. He thought that the nasal and aural troubles were the commonest reflexes which started the cardiac derangement. Dr. Woakes testified that heart perturbation or cardialgia was a common consequent on nasal disease.

MYCOSIS OF PHARYNX AND LARYNX.

DR. LABIT (*Rev. de Lar., etc.*, 1893, No. 5) reports a case of generalized mycosis of the pharynx, rhino-pharynx, base of the tongue, and larynx in a

female patient twenty-eight years of age. Though not completely cured when last observed, it was treated satisfactorily by energetic frictions three or four times a week with a solution composed of iodine 4.25, potassium iodide 70, zinc chloride 45, and distilled water 25 parts, according to the formulæ of Nabias and Sabrazès.

DEMONSTRATIONS OF ENLARGED LARYNGOSCOPIC IMAGES.

PROF. GUSTAV KILLIAN, of Freiburg (*Münch. med. Wochenschr.*, 1893, No. 6), describes and illustrates a method of projecting laryngoscopic images upon a screen for class and other demonstration. The image is received upon a prism, whence it is deflected to the screen. Considerable skill in manipulation is required, but satisfactory images magnified five times can be projected if proper pains be taken. For the details and the diagrams the interested reader had better consult the original article.

PHOTOGRAPHS OF THE LARYNX.

DR. A. NUSEHOLD, of Berlin (*Deutsche med. Wochenschr.*, 1893, No. 12), describes and depicts a new apparatus, with illustrations of its results. The details can hardly be comprehended in a short extract, and the interested reader is referred to the original. The reproductions in the copy seen by the writer are hardly equal to those produced by Dr. French, of Brooklyn.

ARTIFICIAL LARYNX.

DR. JULIUS WOLFF, of Berlin, exhibited at the Congress der Deutschen Gesellschaft für Chirurgie (*Wien. med. Presse*, 1892, No. 36) a patient wearing a modified Bruns larynx, which remained free from collections of mucus, and which enabled the patient to modulate his voice so that he could even sing correctly. This apparatus, which is not described, elicited the highest encomiums from Löbker and from Bruns.

GOITRE.

ARGUING from an incident in his own practice, PROF. JULIUS WOLFF (*Deutsche med. Wochenschr.*, 1893, No. 11) considers that sudden deaths during operations upon the enlarged thyroid gland, or shortly thereafter, are sometimes due to accumulations of mucus in the pharynx, which prevent sufficient passage of air through the compressed or flattened trachea, and thus produce asphyxia. He recommends inverting the patient and swabbing the pharynx out as a quicker and surer means of rescue than tracheotomy, which is so often ineffectual. The various causes to which this not infrequent accident have been attributed are mentioned and accredited.

OTOLOGY.

 UNDER THE CHARGE OF

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 A CASE OF EXTENSIVE CHOLESTEATOMA OF THE MASTOID PROCESS WITHOUT LOCAL SIGNS OF INFLAMMATION; DEATH FROM THROMBOSIS OF THE LATERAL SINUS AND MENINGITIS.

DR. HARRY FRIEDENWALD (*Archives of Otolaryngology*, vol. xx. p. 1) has recorded the history of a case of this kind—that of a man who had had otorrhœa since childhood, after measles. At one time in childhood he had a swelling behind his ear; this was lanced and pus evacuated.

May 17th. Pain in left ear and dizziness. Could not work. No elevation of temperature; pulse 60. Mastoid not tender nor swollen. A spot above line of auditory canal was somewhat tender on deep pressure. Later, however, evanescent. In a month he was better under local treatment of the ear, extraction of polypi, and antisepsis.

One month later (May 25th) patient had a long chill, followed by headache; next day the same thing. Diarrhœa. Temperature normal. From this time on, for two weeks, gradually increasing thrombotic, pyæmic symptoms, rigor, chills, sweating, and fluctuating, elevated temperature—100–104.¹ He complained of great pain in his head. Cerebral abscess, and not thrombosis, suspected. No tenderness in line of jugular vein.

June 7th. Some numbness in right hand. Abscess believed to be in left temporal lobe.

Operation, but no abscess found in the temporal lobe. Post-mortem examination revealed a greenish layer of pus covering the convex surface of the left frontal and parietal lobes, seemingly situated in the pia mater. Firm clot in lateral sinus.

 THROMBOSIS OF THE SINUSES.

HANSBERG, of Dortmund (*Annales des Maladies de l'Oreille, etc.*, 1892), has written an article based upon two cases of suppurative disease of the middle ear. Boy, sixteen years old; chronic otorrhœa from infancy, both ears; never any pain; much treatment from specialists (no excision, however). Suddenly, violent pains occurred in the left ear. Hansberg called in on third day; he found high fever, frontal headache and earache; 39.6° C.; pulse, 110 (malleus present in perforated membrane). No caries found by probe in tympanic cavity. Deafness very great. Mastoid normal. Pain when pressure is made in retro-maxillary region, which is not swollen. Fever continues to fifth day, when vomitings occur; violent headache; pupils

¹ These are symptoms of meningitis and thrombosis (pyæmia) rather than of abscess of brain.—Ed.

continue symmetrical; no ophthalmic examination. Ninth day: Violent chills, then temperature 41.5° C. Tenth day: Chills, seminolence; delirium; no mastoid symptoms; *i. e.*, no swelling, no pain on pressure; no tenderness in retro-maxillary space now; no swelling in line of internal jugular vein. After consultation with former physician it was decided to open the mastoid. Eleventh day of disease: Mastoid chiselled open; bone healthy externally, but after a few strokes of chisel fetid pus escaped in large quantity. Later a discolored spot in upper part of inner mastoid surface was incised, and quantity of fetid pus escaped from sigmoid sinus. Twelfth day: Temperature, 38.8° C.; evening, 38.1° C. Patient feels better; no headache. Thirteenth day: Temperature same. For five days no fever; ear sweet; little discharge. Seventeenth day: Evening, 39.8° C.; violent pains in abdomen; tender on left side; no swelling. Eighteenth day: Pains in abdomen continue. Nineteenth day: Dry cough. Twenty-first day: Chill; pulse 144; 36.4° C., evening. Twenty-second to thirtieth day: Chills, fever; pain in left shoulder. Thirty-eighth day to forty-fifth day: Chills, fever, gradual failure; pain in abdomen; vomitings; finally, temperature below normal. Pain in abdomen and shoulder continue; consciousness remained. Death on the fifty-seventh day.

Autopsy. Clot entirely filling longitudinal sinus; confluent and extending into left transverse sinus as far as the jugular foramen, where it ceased; in the superior petrosal sinus also a thrombus. One and one-half centimetres from the torcular Herophili forward and to the left there was a round hole in the dura mater, 8 mm. wide, which leads into the thrombosed transverse sinus. The opening in the dura mater corresponded furthermore to an opening in the occipital bone. Metastatic abscess in lung and abdomen.

A SUCCESSFUL CASE OF LIGATURE OF THE INTERNAL JUGULAR VEIN AND TREPHINING LATERAL SINUS IN AN EAR CASE, WHILST THE SYMPTOMS OF PYÆMIA WERE WELL PRONOUNCED.

H. H. CLUTTON (*British Medical Journal*) records the case of a boy, ten years old, who had otorrhœa in the right ear for six months after the gripe in 1891. Otorrhœa ceased upon supervention of earache, headache, and marked pyæmic rigor, and variations in temperature from 97° – 105° F. Metastatic suppuration of ulna and ankle also present. Tumefaction over the jugular; vein thickened; the latter was opened, and a loose clot found. Three days later, trephine over lateral sinus, and pus found in it; syringed out by stream from the sinus down through jugular vein and out at opening in the neck, removing broken-down clot and pus. Slow but uninterrupted recovery.

PYÆMIA OF OTITIC ORIGIN SUCCESSFULLY TREATED BY THE REMOVAL OF A PUTRID THROMBUS FROM THE JUGULAR VEIN AND LATERAL SINUS.

DR. PARKER, of Liverpool (*Brit. Med. Journal*), has recorded the very interesting case of a man having chronic otitis media suppurativa since he was fourteen years old. Violent ear pains for a week before he was received into

hospital. For three days frequent chills and vomitings; complete insomnia; temperature 40.5° when received into hospital. Vertigo on rising; stupor, with occasional delirium. Fetid pus flowed from left ear. Painful swelling in the neck on a level with the upper extremity of the internal jugular vein; mastoid intact. Mr. Parker now diagnosed obliteration of the jugular by thrombus extending from lateral sinus. The symptoms indicated sinus-phlebitis.

Pyæmic symptoms; chills and fever increasing for three days; removal of thrombus was performed. Incision fifteen centimetres long, from mastoid along the line of the left jugular vein. The jugular was obliterated by a clot, from its exit from the skull to the anastomosis with the facial vein; the latter also thrombosed for three inches. Thrombotic portions resected. Mastoid trephined and lateral sinus opened, giving vent to fetid odor; it was filled with a grayish, purulent matter. Sinus opened and scraped. All exposed parts washed with sublimate solution. Hemorrhage from sinus stopped by antiseptic wax. Next morning patient read newspaper and remained well two days. Then mastoid swelled, temperature went up to 39° C. Patient became stupid; the tampon of wax was removed and pus allowed to escape. In sixteen days patient was well under antiseptic washings, and has remained so.

HISTOLOGICAL CHANGES IN BOTH PETROUS BONES DUE TO CHRONIC PURULENT OTITIS MEDIA FOLLOWING SCARLATINA; THREE YEARS LATER, MENINGITIS OF CEREBRAL BASE AND CONVEXITY; DEATH.

IN May, 1886, scarlatina and naso-pharyngeal diphtheria in a child five years old. On the fourth day intense pain in both ears, followed immediately by purulent discharge from both ears. At the outset the child became profoundly deaf, and remained so. Immediately after the scarlatinous disease had passed by, the child complained of vertigo, and manifested a markedly staggering gait. For a long time the child had earache and headache.

At the time of the beginning of the last illness, January, 1889, there was a fetid discharge from the ears, which, however, ceased in the right ear, but continued in the left for a few days longer. At this time the temperature fell from 39° and 40° C., to 38° , and thus continued with little variation for six days. At the end of this period the temperature rose to 40.4° C., and purulent discharge came again from the left ear and continued until the child's death. The discharge reappeared in the right ear for only one day, and then stopped again. Temperature remained at 39° C. until a short time before death, when it rose to 40° C.

Complete deafness, somnolence, and unconsciousness. Constipation and sudden screaming in sleep, clutching at her head, vomiting, gritting of the teeth, left-side paralysis of extremities, twitching of the facial muscles, stiffness of the neck, retention of urine, involuntary defecation, abolition of tendon- and skin-reflexes, preceded by general hyperæsthesia. It was not possible to fully straighten the knee on account of the tense flexion at hip-joint. On the left side very intense podalic clonus. Increasing somnolence. For a day before death brownish pus flowed from the nose. Belly indolent, sunken. Pulse varied from 100-120, irregular. With lower temperature the

pulse fell to 80-100. Finally the pulse rose to 140-160. The respirations previously accelerated now sank to 12; Cheyne-Stokes respiration occurred occasionally.

Macroscopic examination of both petrous bones revealed a highly sclerotic state of both tegmina tympanorum; mucous membrane of both attics thick and red. Purulent meningitis of convexity and base; hydrocephalus internus; cavity containing cheesy mass in right bronchus; disseminated tubercle in both lungs; numerous tuberculous deposits in spleen and kidneys; disseminated tubercles in the liver.—S. Moos, *Zeitschrift für Ohrenheilkunde*.

PURULENT BRAIN DEPOSITS, PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

FRANK ALLPORT, M.D., of Minneapolis, Minn. (*Journal of the American Medical Association*), has shown much industry in collecting the data, bringing together notes of 169 cases of the above-named nature. Conditions admitting to the list are mentioned as follows:

1. The patient must have had an ear difficulty resulting in intra-cranial trouble, death, and an autopsy.

2. The patient must have had an ear difficulty resulting in intra-cranial trouble, and the intra-cranial disease exposed by operation.

Men, 86; women, 46; sex not stated, 37; equal 169. Average age, nineteen to twenty years. Most frequent ages involved, seventeen to twenty-six years. Right ear, 81; left ear, 69; ear not stated, 19; equal 169. Cerebro-aural affection dependent upon chronic otorrhœa, 118; cerebro-aural affection dependent upon acute otorrhœa, 10; not stated, 41; total, 169.

OBSTETRICS.

UNDER THE CHARGE OF

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ASSISTED BY

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A CASE OF CÆSAREAN SECTION FOR OSTEOMALACIA.

SEELIGMANN (*Münchener medicinische Wochenschrift*, 1893, No. 14, p. 273) describes a patient, who had had seven children and five abortions. Last child delivered by version and extraction, dying soon after birth. Patient was in a miserable condition, being confined to bed before the pregnancy;

was deformed, having sustained a fracture of the upper third of the right femur. A considerable kyphoscoliosis of the breast existed, accompanied by a lordosis of the lumbar vertebræ.

Pelvic measurements showed: Between the anterior superior spines, 24.5 cm.; between crests, 31 cm.; between trochanters, 32 cm.; conjugata externa, 19 cm.

Internal examination proved it to be a typical osteomalacic pelvis of the shape of the figure 8. The pubic arch showed the characteristic beak form.

Cæsarean section being decided on, the operation was done in the patient's own room, on a table. After delivering the child, the uterus and appendages were removed, considerable hemorrhage being encountered. A thermocautery was used on the stump. After the broad ligaments, which were somewhat torn, had been stitched, the peritoneum of the stump was united to that of the belly, and the remaining wound closed by silk sutures, which included peritoneum, muscles, and abdominal skin. A broad transverse needle secured the extra-peritoneal stump, over which were laid broad adhesive strips. The operation lasted fifty minutes. The child was a healthy male. On the fourth day the infant was attacked with ophthalmia neonatorum, which yielded to a 2 per cent. solution of silver nitrate. The mother's abdominal wound united by first intention.

Five days after the operation, in order to relieve, if possible, the osteomalacia, the patient was placed in two Volkmann's extension bands, these being attached to each lower extremity, and counter-extension being made by bands under the arms. Before putting on the bands the measurements were as follows: Whole length (patient horizontal), 125 cm.; from left trochanter to sole of foot, 89 cm.; right trochanter to sole, 84 cm.; trochanter to head, 36 cm. Weights made of sand-sacks were employed, but not constantly.

After six weeks the bands were taken off and the following weights attached: To upper left extremity, $9\frac{1}{2}$ pounds; right inferior extremity, $11\frac{1}{2}$ pounds; under arms, $11\frac{3}{4}$ pounds.

The final result was as follows: The woman had become 18 cm. longer. The right inferior extremity was nearly as long as the left. After taking away the extension bands, the patient was taken out of bed and stood up, the increase of size remaining complete. Pain and swelling of joints have disappeared, and internal examination shows the configuration of the pelvis notably improved. The diagonal conjugate, formerly 8 cm., is now 9 cm. The kyphoscoliosis has straightened, as well as the lordosis. Power of movement increased, so that she can now attend to her household duties, only requiring a thin stick to assist her in walking. Ovaries and uterus were normal on examination.

FETAL ASCITES A CAUSE OF DYSTOCIA IN LABOR.

PARISOT (*Archives de Tocol. et Gyn.*, 1893, No. 4, vol. xx. p. 291) relates a case of Prof. Herrgott's, in which a II-para, of syphilitic history, was delivered prematurely of a dead infant. On her admission the extraordinary size of the abdomen, out of all proportion to the time of her pregnancy, was noticed in the patient. Palpation did not give clear results, and on auscultation

tion the heart-sounds could be heard on the right, but were heavy, obscure, and intermittent. Delivery was accomplished by forceps, great traction being necessary, and during the birth the head was torn off. The abdomen of the fetus was of large size, measuring 19 cm. in diameter on a level with the umbilicus. It was punctured and the liquid drawn off. The genito-urinary organs had no orifice and the anus was imperforate. The bladder had no outlet and was greatly distended.

The author also relates a case of his own; a III-para, of specific history, was delivered by forceps after a labor of six and half hours. The child died at once.

On admission, abdomen was markedly globular, and the size out of proportion to the time of pregnancy. Heart-sounds were heard clearly on the left side. Vaginal examination showed membranes intact, and head strongly engaged. On rupture of the amniotic sac only a small quantity of fluid escaped. Although the head was small and easily delivered by forceps, great difficulty was encountered in the extraction of the trunk. The abdomen was enlarged, measuring 45 cm. in circumference at umbilicus, and was accompanied by a general infiltration of the cutaneous tissues and a secondary enlargement of the neck. A wound 5 cm. long, involving skin and cellular tissue, over larynx. The patient's pelvis was normal in size. The placenta was found to be greatly enlarged, weighing 1600 gm. Length, 26 cm.; width, 21 cm.; thickness, 4 to 5 cm., and on section it was found to have undergone granular and fatty degeneration.

The autopsy on the fetus revealed the following facts: Weight, 2100 gm.; head small; abdomen contained 240 gm. of a reddish liquid; liver three times as large as normal, weighing 190 gm., measuring 11 by 6 cm. On section, it showed a yellow-brown color with scattered reddish-brown spots. Spleen and kidneys enlarged markedly. Lungs normal. The writer, in concluding, remarks that syphilis is the most common cause of ascites in the fetus.

INTESTINAL COMPLICATIONS OF PREGNANCY AND LABOR.

BUDIN, in the Obstetrical Clinic at Hôpital de la Charité (*Semaine Médicale*, 1893, No. 19, p. 141), in a lecture on the "Relation of the Uterus to the Intestines, Viewed from a Clinical Standpoint," relates a number of cases where, a few days after labor, a woman became feverish with abdomen tympanitic or slightly tender, but without any inflammation of uterus or appendages. The large intestine was found distended, especially the sigmoid. A purgative and enema being administered, there came away vast quantities of feces, and the symptoms all disappeared. He regards the above as a stercoræmia, or auto-intoxication of intestinal origin, and not to be confounded with puerperal septicæmia. He claims, also, that there is a peritonitis of intestinal origin due to the bacterium coli commune passing into the peritoneum, and that an examination of the liquid contents of the abdomen shows this bacillus and not streptococci. He quotes the case of a woman who died of abortion following retroversion, who had been curetted, and fetid fragments withdrawn from the uterus; these gave a pure culture of bacterium coli commune, and these were also found in her peritoneum,

uterus, heart, blood, and pus. He also claims obstinate constipation and fecal accumulation as a cause of abortion and of obstinate vomiting. If umbilical hernia appears during gestation, it never becomes strangulated, as the ring widens as the uterus enlarges; also, if inguinal or crural hernia be present, the uterus pushes up the intestines and thus they are not gripped. Tympanites or a gluing together of the intestines may simulate pregnancy.

In cases of rents of the genital canal, loops of small intestine may descend occasionally, and have been removed as the cord.

ONE HUNDRED AND TWENTY-FOUR SYMPHYSIOTOMIES.

VARNIER, in the *Annales de Gynécologie et Obstétrique*, 1893, t. xxxiv. p. 241, sums up the present status of symphysiotomy by tabulating 124 cases as follows:

Mothers: 112 recovered, 12 died.

Children: 92 lived, 32 died.

Of the mothers, 8 died from causes clearly disconnected with the operation. Of the remaining 4, 1 died of septicæmia; 1, of sphacelus of the vulva and vagina; 1, of cellulitis and peritonitis, due to the use of a saw and to forcible introduction of hand and arm in order to obtain version; 1, of hemorrhage and shock of operation and of lacerations of the perineum, vulva, and bladder.

In regard to the infant mortality, 5 cases should be eliminated, where the operation had been done in place of embryotomy; 119 cases of living children remain. Of the 27 remaining deaths, 7 were due to causes not results of operation; 11, to mishaps with forceps, or in version; 7, in succession to incomplete section; 1, to prolonged extraction due to distortion of the right arm; 1, to cerebral lesion due to prolonged pressure on the head. Conclusions:

1. The operation properly performed does not entail immediate or consecutive disorders of the sacro-iliac synchondroses.

2. In pelves not *extremely* contracted, the enlargement resulting from the operation is sufficient for a living child at term to pass through.

3. The finding and cutting of the symphysis presents no great difficulties; only three cases out of 125 are reported where the operation has failed in this.

4. No especially dangerous venous hemorrhages are apt to be encountered.

5. The anterior rents of soft parts may be avoided if the accoucheur remembers that after section the inferior strait is oval transversely and not of the normal shape.

ECTOPIC GESTATION WITH RETAINED FŒTUS.

GOTTSCHALK, at a meeting of the Société de Médecine Interne (*Médecine Moderne*, 1893, No. 25), presented a very rare and interesting preparation. A woman, fifty-four years old, was delivered at twenty-three years, and again became pregnant. In due time pains came on, but delivery did not advance. An extra-uterine pregnancy was diagnosticated, and the woman left to her fate. After eighteen weeks in bed with peritonitis she recovered, and although menstruation again appeared, she never again became pregnant. One could feel through the abdominal walls a tumor as large

as a head. After five years of distress, the abdomen was opened by a longitudinal and transverse incision and the tumor removed. The placental insertion was on the broad ligament of the left side. She recovered without complications. The tumor presented was a fœtus, still well preserved, covered by a thick calcareous envelope.

THE OBSTETRICAL SOCIETY OF PARIS.

At a meeting of the Société Obstétricale de France (*Semaine Médicale*, 1893, No. 13, p. 157) WALLACH discusses rigidity of the os uteri during labor. He had examined its tissues and found only œdema, with little or no alteration of its fibres, and regards this as due to pressure. It is often the preparatory step to tears of the neck.

Concerning pathological induration of the uterus, M. GUERNIOT recommends Cæsarean section if the neck be largely involved and the child living. If it be dead and pregnancy but little advanced, and especially if a part of the neck remains healthy, one hesitates to proceed to extremities. He then uses small incisions, widening thus a passage for the child as needed, cutting all restraining bands. These cuts he finds to be but slightly dangerous. In cases of advanced carcinoma, Porro's operation is indicated.

During the discussion of vicious insertion of the placenta, it was stated that this may be marginal at first and become central as the os stretches, the placenta not separating to a corresponding degree. Insertion is complete when the cotyledons occupy the area of the uterine neck, dilatable or dilated. Forty cases have been observed, with eight autopsies. In this condition the neck is especially supple, due to the excess of vascularity; tears are rare. Prognosis for the child in this affection is bad; about 80 per cent. perish. The maternal mortality is 35 per cent. Treatment consists of tampons in the vagina, or Braxton-Hicks version; this is sometimes difficult.

M. CHAMBRELENT discussed some experiments on the passage of streptococci and other cocci and the bacterium coli through the placenta—rabbits being used. The bacteria traversed the placenta, and were found in the embryo and fœtus at various periods of gestation. No alteration of the placenta seemed necessary for this change.

During the discussion of the anatomical lesion of auto-intoxication during pregnancy (*op. cit.*, p. 158) BOUFFE DE SAINT-BLAISE stated that he had examined the organs of thirty-one women dying from eclampsia, and found in all what he believed to be the characteristic lesion of this disease, namely, congestion and hemorrhage of the terminals of the portal vein. The microscope showed capillary dilatation or true apoplectic foci with necrotic patches. These seemed to indicate an intoxication proceeding from intestinal or microbic origin. The blood is surcharged with poisons. As therapeutics, chloral and chloroform are recommended; it is also useful to inject artificial serum into the veins and cellular tissue.

RIVIERE (*ibid.*) reports 16 cases of curetting—8 after abortion, 8 after confinement. Of three failures, 1 was for eclampsia, 1 in uterine perforation due to an attempt at abortion, 1 of intervention on the fourteenth day. He had 13 successful cases. Operation was indicated in three cases of abortion; hemorrhage was present, and in other cases septicæmia. In the first three

cases he curetted without previous tampon. In septicæmia, if irrigation and injections fail, he curettes, and afterward inserts a pencil of iodoform. He uses a sharp curette. Care should be taken to avoid perforating the uterus.

PLACENTA PRÆVIA LATERALIS.

WILBUR (*Boston Medical and Surgical Journal*, 1893, vol. cxxviii., No. 18) reports the case of a multipara, thirty-five years old, who, when three months pregnant, began to have increasing uterine hemorrhages, at first unaccompanied by pain. Ether was given, and after manual dilatation of the os, version was performed and the foetus extracted rapidly. The placenta was felt in the left side at the margin of the inner cervical ring. Hemorrhage during and after the operation was considerable. Subcutaneous injections of stimulants were resorted to, and a large enema of salt solution was given. Patient recovered entirely.

A CASE OF CÆSAREAN SECTION FOR RHACHITIC DEFORMITY; RECOVERY OF MOTHER AND CHILD.

GRIFFITH (*British Medical Journal*, March 25, 1893) reports an interesting case of the above-named operation:

A primipara, twenty-six years old, in labor about twenty-four hours. One paternal uncle and one sister were deformed by rickets. The patient, on admission, was rhachitic, with marked lordosis of the pelvis, which presented the following measurements:

Crests,	.	.	.	.	.	.	.	9 $\frac{3}{4}$ inches.
Spines,	.	.	.	.	.	.	.	9 $\frac{3}{4}$ "
Conj. ext.	.	.	.	.	.	.	.	5 $\frac{1}{2}$ "
Conj. diag.	.	.	.	.	.	.	.	3 "
Conj. ver.	.	.	.	.	.	.	.	2 $\frac{1}{2}$ "
A. P. diam.	.	.	.	.	.	.	.	2 $\frac{3}{4}$ "

The sacrum was found, as in all cases of severe rickets, convex from above downward and from side to side, as well as somewhat oblique.

The operation presented no especial difficulties. The hemorrhage, which was slight, was controlled by two fingers' pressure of the left hand. Silver wire was used for the sutures, the stitches being passed through the whole thickness of the muscular wall; twelve thick sutures in the body, and four thinner ones in the upper part of the cervix, all placed close together and secured by twisting. The ends were cut so short that, on passing the finger along the wound, no ends of the wire could be felt. The oviducts were ligated in their middle with fine silk. No irrigation or sponging was necessary, and the abdominal wound was closed with silkworm-gut. Both mother and child made a perfect recovery.

From the varying success of this operation, and especially the successes of those who, having no special knowledge, have operated under circumstances in which they were unable to obtain skilled assistance, the writer concludes that the requisites for success are of the simplest kind; but such as they are, they are essential, and to disregard them is to fail:

1. No case is favorable which is septic at the time the operation is to be performed. In such cases the child can be disregarded; it being already

dead, and we have only to consider the mother. In these cases it is better to avoid Cæsarean section.

2. Absolute cleanliness—to be obtained by whatever means; we most rely upon the simplest that are effectual.

3. We must use a reliable suture for the uterus—one that will not come untied in spite of the rhythmical relaxations and contractions of the uterine wall. It is immaterial whether silk or silver wire is used, both having advantages. The suture should be inserted through the whole thickness of the muscular wall, avoiding the decidua, and at a sufficient distance from the edge of the wound to prevent its cutting out.

VAGINAL HYSTERECTOMY IN THE PREGNANT CANCEROUS UTERUS.

McNUTT, in an article read before the San Francisco Gynecological Society (*Pacific Medical Journal*, 1893, xxxvi.), reports the case of a woman, aged twenty-nine, of good family history, mother of four children, with three miscarriages. Examination showed the cervix enlarged, with epithelial-like excrescence, quite filling the vagina, and bleeding at the slightest touch. Bimanual examination revealed the fact that the body of the uterus was much enlarged and quite movable except at the left vaginal juncture. There was constant hemorrhage, but no regular menstruation for three months. A diagnosis of probable pregnancy, complicated with uterine cancer, was made, and vaginal hysterectomy advised. The uterus was found at the operation to be larger than the bimanual examination indicated; many adhesions were present. The tissues were very vascular, and the hemorrhage more than usual. It was found impossible to ligate or clamp on account of the cervical growth, and after much difficulty he succeeded in bringing the fundus down, but even then was unable to ligate and clamp on account of the size of the uterus, which filled the vagina completely. On this account he was compelled to split the uterus, and the child was delivered. Uterus and appendages were removed. The patient made a good recovery.

When the child has been carried to full term, it has been found that over 50 per cent. of the mothers die undelivered, and of those delivered at the end of gestation about 30 per cent. die within a few days after delivery, making over 80 per cent. of maternal deaths if the child is carried to term. He strongly recommends early vaginal hysterectomy in these cases.

OBSTETRIC PARALYSIS WITH REFERENCE TO ITS PATHOLOGY AND ETIOLOGY.

CARTER, in an interesting article (*Boston Med. and Surg. Journal*, 1893, vol. cxxviii., No. 18), reports fifteen cases of the above affection which have come under his observation in the past two years, and a physical examination has revealed certain conditions common to all, with one exception. The affected arm is held by the side in a position of internal rotation, the elbow pointing outward; the fingers are usually semi-flexed. A careful examination has shown that in every case there has been a paralysis of the deltoid, supra- and infra-spinatus, teres minor, biceps, and brachialis anticus, together with the supinators. In some of the severe cases there has also been paralysis of

some of the extensors of the wrist, or more especially the fingers. In looking for the location of the lesion we at once find that the distribution is very similar to the paralysis of Erb.

Experiments of Ferrier and others, together with anatomical investigations in cases where this type of paralysis has been occasioned by injury to nerves, or by pressure of new growths, have definitely proven that the nerve supply of the muscles most frequently affected by the condition under discussion is derived from the first trunk of the brachial plexus, which is made up by the union of the fifth cervical roots together with the communicating branch from the fourth.

As regards the causes of the above injury, those most commonly assigned are:

Pressure on the neck, from blade of forceps, finger, or hook.

Over-extension of arm.

Pressure in axilla in stretching.

The writer suggests that another cause, of which little or nothing has been said by the various authorities, is the stretching of the uppermost trunk of the plexus, either by traction on the head, by the hands or forceps, by traction on the shoulders in extracting the after-coming head, or by rapid expulsion of the head from contraction of the uterus when a shoulder has met with some obstruction, as, for instance, the brim of the pelvis, thus widely separating the head from the shoulders, and stretching the nerve trunks. This is also helped by the flabby condition of the newborn child, with the comparatively inelastic nerve trunks.

It does not seem to be settled that loss of sensation is constant in these cases, or if present, it does not always become permanent.

It is a well-known fact that the paralysis of poliomyelitis rarely, or probably never, entirely disappears, and that if improvement takes place it is usually within the first few months from the onset. With the above-named class of cases the opposite is the rule.

In regard to the prognosis of obstetric paralysis, it is good, but frequently exceedingly slow. Recovery varies from a few months to two or three years. The great majority get well, as is indicated by the fact that none of the physicians connected with the Nervous department of the Massachusetts General Hospital has ever seen the condition, dating from birth, in an adult patient, and the writer has only been able to discover one case where paralysis persisted to adult life.

The treatment consists mainly in the use of passive movements, massage, and electricity. Galvanism over the affected muscle and through the region of the brachial plexus, frequently applied for months, seems to be the most successful means of relief; though Lovett has suggested the use of the Velpeau bandage to prevent relaxation of the ligaments of the shoulder. The author gives several interesting tables on this form of paralysis, and shows that the injury bears a relation to certain presentations and positions.

PUERPERAL NEURITIS.

LAMY (*Gazette hebdomadaire de Médecine et de Chirurgie*, 1893, No. 15, p. 170) describes a condition of neuritis existing in the puerperal state which

differs in several important characteristics from the ordinary type. This form, which consists principally of pain and paralysis, with muscular atrophy, involves most frequently the lower limbs, and has often been ascribed to pressure on the pelvic nerves by the foetal head. All cases do not admit of this explanation.

Moebius attributes puerperal paralysis to infection, and shows the analogy to paralyzes following erysipelas or typhoid, considering the latter due to parenchymatous and peripheral change. It often develops many days after a simple labor, and amid symptoms indicating puerperal infection. It frequently happens that paralyzes of this kind limit themselves to the group of muscles supplied by the external popliteal nerve. The author divides this disease into three groups: Infectious, traumatic, and neuritic by propagation. Of the first, we find one class in which the paralysis and pain extend to all four extremities and trunk; of the second, the want of power is localized, infecting only the upper or lower limb. Of the general neuritis only three cases have yet been reported.

The constitutional symptoms are similar to those of ordinary neuritis, persistent vomiting seeming to be somewhat characteristic. The onset of the paresis is announced by troubles of sensation, formications, pinching of limbs, and increasing muscular debility, particularly attacking the extensors of the hand and foot. The walk is peculiar; a light passing hyper- or hypo-æsthesia may be present. The muscular masses, tendons, and nerve trunks are tender on pressure, independently of spontaneous pains. These symptoms amend when the period of actual paresis comes on. Tendon reflexes are abolished, and reactions of degeneration have been witnessed in the atrophied muscles. In one case death took place in three months, in a condition of general infection. The muscles of the trunk and abdomen had been attacked as well as the sphincters. The spinal column had also been affected. The disease is very difficult to diagnosticate from "acute central myelitis." The fact of its appearing after childbirth, or with symptoms of infection, will aid in the diagnosis.

Charcot calls attention to a peculiar amnesia for recent events, combined with an otherwise sound condition of mind.

The most successful treatment has been found in electricity. The disease tends toward recovery in from eighteen months to two years.

POST-MORTEM BIRTH.

MORITZ (*Vierteljahrsschr. für gerichtl. Med.*, 1893, N. F., Bd. v., Heft 1, S. 93) reports a case in which the body of a woman, dying undelivered during pregnancy, was disinterred several days after burial. The body was found in an advanced stage of decomposition. The foetus was found in the coffin, and it was supposed that the pressure of gas in the mother's body had forced it from the uterus.

THE PORRO OPERATION FOR PUERPERAL ECLAMPSIA COMPLICATED BY HYPERTROPHIC CERVIX.

GROOM (*Medical Press*, 1893, No. 2812, p. 323) reports a primigravida taken with eclampsia during labor. The genital canal was very narrow and

undilatable; the foetal head high in the pelvis, and the progress of labor ceased. It was found impossible to dilate the cervix; accordingly the Porro operation was performed, and a healthy male child delivered asphyxiated, but which subsequently recovered. The mother perished in an eclamptic seizure.

SYMPHYSIOTOMY FOR CONTRACTED PELVIS.

COE reports (*Medical Record*, 1893, No. 1172) a case of symphysiotomy in a primipara having a contracted pelvis and deficient in mental development. The true conjugate was barely three inches; the head presented, but could not enter the pelvis. The operation was performed under antiseptic precautions, and the joint severed by a probe-pointed bistoury. The bones did not separate to any extent until the sub-pubic ligament was divided. Version was then performed with difficulty, and the child, weighing eight pounds one and a half ounces, was delivered deeply asphyxiated. Owing to the depth of the wound, the tissues about the symphysis were not sutured, but the bones approximated by pressure and by a strip of adhesive plaster. The patient recovered perfectly from the operation, but developed mania. She died demented two months after the operation, and a careful examination of her pelvis showed that firm union had taken place at the site of the pubic section.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,
OF NEW YORK.

PAPILLARY OVARIAN CYSTOMA WITH SECONDARY GROWTHS ON THE INTESTINES.

THEILHABER (*Münchener med. Wochenschrift*, 1893, No. 15) reports a case of coeliotomy for ovarian cyst complicated with secondary growths on the intestines, the patient having ascites and being so cachectic that it seemed fair to infer that the prognosis was most unfavorable. She was in good health a year and a half after the operation, a fact which seemed fully to justify removal of the tumor in such cases, in spite of the various opinions to the contrary. Similar cases have been reported by Burt and Leopold.

ASCITES DUE TO PAPILLOMA OF THE PERITONEUM.

SUTTON (*Lancet*, April 8, 1893), in a clinical lecture on hydro-peritoneum, calls attention to the fact that operators are often alarmed on opening the abdomen to find a papillomatous cyst with secondary growths on the peritoneum. He thinks that these are comparable to a crop of warts on the skin,

i. e., they may appear and disappear suddenly. The epithelium covering them is easily detached, and the cells float about in the ascitic fluid and sink to the bottom of the pelvis, to become attached to the peritoneum and form the nuclei of new growths. "Remove the tumor, the supply of germ-epithelium ceases, the warts die, and the crop is not replenished." From the large number of cells found in the peritoneal fluid in these cases the presence of cancer might be inferred, but experience has shown that the microscope is an uncertain aid to diagnosis in this respect.

NEOPLASMS OF THE UTERUS OF DECIDUAL ORIGIN.

SÄNGER (*Archiv für Gynäkologie*, Band xlv., Heft 1) contributes an elaborate article on this subject, to which he has previously furnished a valuable contribution (*Centralblatt für Gynäkologie*, 1889). He describes and reviews the history not only of so-called *sarcoma uteri deciduo-cellulare*, which he had before described, but of all the other forms of decidual neoplasms, which he classifies as follows:

1. Inflammatory conditions, such as decidual endometritis, either hyperplastic, cystic, or polypoid, with a sub-variety of syphilitic origin. 2. Decidual polypi, including several different varieties. 8. True neoplasms, of which there are to be differentiated adenoma, "benignant" and "malignant" deciduoma (which he calls "deciduo-sarcoma"), and the *sarcoma chorion—deciduo-cellulare* of Gottschalk and Kaltenbach.

TREATMENT OF PELVIC SUPPURATION.

TERRIER and HARTMANN (*Le Mercredi Médical*, 1893, No. 15) summarize the results of their observations in fifty-nine cases as follows: Cœliotomy is preferable to vaginal hysterectomy in the treatment of such cases, because it is often possible to save one tube and ovary—a fact which, together with the lessened risk, outweighs the mere object of avoiding an abdominal cicatrix. The latter operation, however, should not be entirely rejected, since it is applicable to rare cases of bilateral suppuration in the peri-uterine cellular tissue, as well as to those of multiple purulent foci within the pelvis. The writers resorted to it in only four cases, two of the patients being cured.

FIXATION OF THE UTERUS TO THE PERIOSTEUM OF THE SYMPHYSIS PUBIS.

KUEMMEL (*Deutsche med. Wochenschrift*, 1892, No. 49) reports six cases in which he practised a new method of fixation of the retroflexed uterus. After replacing the organ, three sutures were passed through the fundus and the periosteum on the posterior surface of the symphysis. A median suture was inserted deep into the muscular tissue of the fundus and beneath the periosteum, with two more superficial lateral sutures to support it. Caution is necessary in order not to break the needle against the bone. The writer believes that this method secures firmer and more permanent fixation than any other. Of the six cases, three were of retroflexion and three of prolapsus, one patient in the first class being normally delivered eighteen months after the operation, the uterus remaining in the same position six months later. In

the other five the uterus was found to be firmly adherent to the symphysis from one to two years after the operation.

[On theoretical grounds, it would seem as if fixation of the uterus to the symphysis would interfere materially with the functions of the bladder, as seen in cases of pathological adhesion.—H. C. C.]

THE ETIOLOGY OF PRIMARY TUBERCULOSIS OF THE GENITAL TRACT.

FRANKENBURGER (*Münchener med. Wochenschrift*, 1893, No. 17) discusses the possibility of infection through coitus, which he regards as probable, though not positively demonstrated by the presence of tubercle-bacilli in the semen of the male. Most writers affirm that when both the uterus and tubes are affected, the latter are the primary seat of infection. On the other hand, he affirms, tuberculous infection may long remain latent in the tube without producing any pathological appearances.

TOTAL EXTIRPATION OF THE FIBROID UTERUS.

PÉAN (*Annales de Gynécologie*, 1892, No. 7) has modified his original operation, in which, after clamping the upper portion of the broad ligaments, he excised the tumor, then secured the uterine arteries with clamps and removed the stump *per vaginam*. Now, he applies a rubber cord temporarily, removes the uterus, then dissects off the bladder and rectum, and adjusts an *écraseur* below the cord. The ends of the wire are carried down into the vagina, and it is left to come away with the stump.

THE HISTOGENESIS OF EPITHELIAL TUMORS OF THE OVARY.

STRATZ (*Zeitschrift für Geburts. u. Gyn.*, Band xxvi., Heft 1) concludes that adenomata may develop from either the external or follicular epithelium through the inclusion of cell-ingrowths. The origin of the cystic or papillary form depends upon the relative share which the parenchyma or stroma takes in this process. It is probable that dermoids also develop from adenomata.

EXPERIMENTAL CONTRIBUTION TO ABDOMINAL SURGERY.

THOMSON (*ibid.*), from experiments on dogs, arrives at the following conclusions with regard to lesions of the intestines and ureters:

1. Intestinal sutures. The Czerny-Wölfler suture best fulfils all the indications in enterorrhaphy, other methods being uncertain and dangerous.

2. In lesions of the gut a careful distinction should be made between cases as to whether the tissue is normal or diseased. Simple defects of the serous covering, not over half an inch square, may be disregarded; larger raw surfaces may be covered with healthy mesentery, or attached to the parietal peritoneum in such a way that no bend or twist will be caused. Small wounds involving the muscular layer may heal after suturing, but it is often better to cover them as before mentioned; if larger, resection is necessary. Deeper lesions, especially in a diseased intestine, require resection; if this is not possible, they should be thoroughly disinfected and covered with mesentery, with gauze drainage. Free peristalsis does not prevent adhesions.

3. Injury to the ureters. It is not advisable to attempt to suture a divided ureter in continuity, even over a catheter, as there is great danger of stenosis. Neither is it proper to suture the proximal end into the bladder or intestine; nephrectomy offers the only certain chance of cure.

MEDIAN SECTION OF THE UTERUS IN VAGINAL HYSTERECTOMY.

QUENN (*Centralblatt für Chirurgie*, 1892, No. 42) recommends the following method of extirpating the uterus *per vaginam* in cases of pelvic suppuration: After separating the cervix the broad ligaments are secured with clamps. Then the uterus is divided in the median line up to the fundus. The endometrium is thoroughly cauterized with a 10 per cent. solution of chloride of zinc. The cut is next extended through the fundus, each half of the organ is seized in turn with a volsella and is twisted out and excised. The peritoneum is sutured to the edge of the vaginal wound according to Martin's method. This plan is regarded by the writer as a marked improvement over Péan's method of *morcellement*.

ICHTHYOL IN THE TREATMENT OF GONORRHOEA.

JADASSOHN (*Deutsche med. Wochenschrift*, 1892, Nos. 38 u. 39) reports thirty-seven cases of gonorrhœa in the female treated by injections of solution of ichthyol (from one to ten per cent.). He has found the drug most valuable in cases of specific urethritis and cervical endometritis. It is applied either on an applicator or on strips of gauze, which are left *in situ* for an hour. A ten per cent. solution in glycerin is used in the cervical canal. In the early stage of acute gonorrhœa he thinks that ichthyol is even better than nitrate of silver.

CONSERVATIVE OPERATIONS UPON THE OVARIES.

POZZI (*Ann. de Gyn. et d'Obstétrique*, March, 1893) reports twelve cases in which he practised resection and ignipuncture of diseased ovaries with satisfactory results. He reviews the history of the operation, especially the work of Schroeder and Martin, and lays down the general rule that whenever the tube is healthy and the corresponding ovary alone is diseased, the latter should not be entirely sacrificed unless it appears to be absolutely necessary. The most favorable cases for resection are those in which a portion of the ovary remains quite healthy, especially where there is a single follicular cyst. The technique consists in first establishing the fact that the tube is patent by introducing a fine probe throughout its entire length. Then the surgeon fixes the ovary between his thumb and finger, and removes a wedge-shaped mass containing the diseased portion; the raw surfaces are then united with catgut, which serves to control the hemorrhage, deeper sutures being passed if necessary. Slight compression is sufficient to arrest oozing from the needle-punctures.

In many cases the surface of the ovary is covered with small cysts, the only healthy portion of the stroma being confined to the hilus; under these circumstances almost the entire gland can be excised.

In his later operations the writer says that he has also performed "sal-

pingorrhaphy," or suture of the fimbriated extremity of the tube to the remains of the ovary, in order that the ovum, when discharged, may have no difficulty in entering the duct. This procedure is especially applicable to cases in which it has been necessary to separate adhesions around the tube, which would tend to promptly reform.

He has of late frequently substituted ignipuncture with the thermo-cautery for resection, where the surface of the ovary was studded with small cysts. If there seems to be general cystic degeneration, the point may be bored into the depths of the stroma. It has been objected that the result of this treatment would be to cause the formation of cicatricial nodules within the stroma, which would not only prevent the normal development of the Graafian follicles, but would favor the formation of new cysts. To this the writer replies, that since the cauterization is aseptic, the eschar is absorbed without the presence of an inflammatory process, the conditions being essentially different within the peritoneal cavity from those present on the exterior of the body. On the contrary, the clinical results of his operations have convinced him that the "substitutive irritation" produced by the cautery actually favors the absorption of cirrhotic tissue. Ignipuncture of a follicular cyst is not to be compared with cauterization of a cystic cervix.

In commenting on his cases, the writer calls attention to the fact that in only one did he fail to relieve or to cure the painful symptoms due to the ovarian disease—a result as good as could be obtained by castration. Menstruation recurred regularly after the operation, and was more profuse than before, even in patients who had previously had an irregular and scanty flow.

[Professor Pozzi has probably not had his attention called to the pioneer work of Dr. W. M. Polk, of New York, whose papers on this subject have attracted attention here and abroad.—H. C. C.]

PÆDIATRICS.

UNDER THE CHARGE OF

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OF PHILADELPHIA;

ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,

OF PHILADELPHIA.

TREATMENT OF VESICAL CALCULUS IN BOYS.

POUSSON, in reporting (*Gazette hebdomadaire des Sciences Médicales de Bordeaux*, No. 24, p. 308) a case of cystotomy for stone in a boy of eleven years, makes the following conclusions from a study of the literature:

1. The opinion of surgeons of different countries upon the comparative value of the supra-pubic operation and lithotripsy in children is not yet fixed. In France the preference is on the side of the cutting operation, and the statistics of lithotripsy, though very favorable, are perhaps misleading from the diversity of their sources.

2. The dimensions of the urethra of the child, which are still uncertainly determined, are the most serious obstacle to the generalization of lithotrixy at this age.

3. The supra-pubic operation is almost demanded in children because of the situation of the bladder and the dangers of wounding the ejaculatory ducts, to which almost all the perineal operations expose.

4. Ballooning the rectum, far from being indispensable, is sometimes troublesome and even dangerous; a simple sponge in the bowel suffices to maintain the bladder in position.

5. Union of the bladder by first intention, after suture of the wound, is possible in children. In this case the retained catheter is at least prudent, if not absolutely indispensable.

THE VALUE OF INDICANURIA AS A SIGN OF TUBERCULOSIS.

IN 1890 Hochsinger, of Vienna, advanced the proposition that the presence of a notable amount of indican in the urine of children from one to six years of age was a conclusive sign of the existence of tuberculosis. In 1892 Kahane published a detailed study of the subject, in which he quoted the cases studied by Hochsinger and made it evident that in many instances but a single examination of the urine for indican had been made. He, however, reached conclusions corroborating those of Hochsinger. Up to the present time no further papers on the subject have appeared, excepting the more exhaustive study of the younger Steffen. This author grouped together 18 cases of known tubercular disease, dividing them into two classes as the children were under or over six years of age. In the first group, of 9 cases, there were made 654 examinations of the urine, with the result that no indican was found 372 times; a trace, 120 times; a little, 94 times; a moderate quantity, 42 times; considerable, 25 times; and once a very large quantity. In the second group of cases, with 533 examinations, no indican was found in 334 instances. These results obtained in cases of positive tubercular disease are diametrically opposed to the conclusions of Hochsinger and Kahane.

VOUTE, of Amsterdam, has now published a new study of the subject (*Revue mens. des Maladies de l'Enfance*, 1893, p. 49). His method of examination is that of Jaffé, as modified by Stokvis of Amsterdam. In the majority of examinations he precipitated the urine by a certain quantity of a ten per cent. solution of acetate of lead, which renders the separation of the chloroform easier and prevents the formation of an emulsion with the rest of the liquid.

Two series of cases were studied; the first, embracing cases where latent tuberculosis could be presumed, cases of more or less advanced tuberculosis, and so-called scrofulous cases—a total of thirty-seven; the second series including cases of digestive derangements, or of diseases in which digestion was not disturbed. The second series thus controlled the first, for if tuberculosis be generally accompanied by an increased production of indican, the relative amounts should be greater in the first than in the second series of cases. The result of these analyses was comparable to Steffen's observations. In 39 examinations of the first series, for cases under six years of age, no indican was found 10 times, and a very strong reaction in 11; while in 32

examinations in the second series, under like conditions, no indican was found in 7 instances, and a very strong reaction in 11. Thus, instead of finding larger quantities of indican in the first, or tuberculous series, the result was rather inferior to that obtained in non-tuberculous cases.

It is well known that a trace of indican appears in the urine of healthy adults and most children over one year of age; and that this proportion may be greatly augmented by disease or disturbed function of the small intestine. Thus Jaffé found enormous quantities of indican in cases of intestinal occlusion. Hochsinger and Kahane believed that an explanation of their theory could be found in the alterations in the digestive apparatus consequent upon the general atrophy of the organism produced by tuberculosis; but from the results just detailed it seems necessary that experiments on a much more extensive scale must be instituted before any definite importance should be attached to Hochsinger's sign.

THE BACILLUS OF LÖFFLER IN THE PHARYNX AFTER DIPHTHERIA.

TOBIESEN (*Centralblatt f. Bakteriologie*, 1892, p. 587) publishes a study upon this interesting point. He states that the bacillus has been found in the throat after the fall of the membrane as long as six weeks by Roux and Yersin and by Ritter. He himself has frequently found it on the fourth, fifth, and sixth day, and, in one case, on the tenth, twenty-second, and thirty-first day after the fall of the membrane. The frequency of the bacillus under these conditions has no connection with the gravity of the case. Concerning the influence of complications in favoring the continued existence of the bacillus, croup seems doubtful, but diphtheritic coryza certainly does favor it. Among 19 guinea-pig inoculations with the bacillus thus derived, 16 animals died within twenty-four to fifty hours, and the 3 remaining ones had either necrosis or paralysis. The natural conclusion of this study is that diphtheria patients, after leaving the hospital, are very liable to communicate the disease to others. As a matter of fact, upon following up such patients returning home carrying the bacillus in the secretions of the mouth, Tobiesen has been able to find but one case of the disease, and that one doubtfully, to be referred to such a source of contagion.

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CASES OF MYXŒDEMA AND ACROMEGALIA TREATED WITH
BENEFIT BY SHEEP'S THYROIDS:

RECENT OBSERVATIONS RESPECTING THE PATHOLOGY OF THE CACHEXIAS
FOLLOWING DISEASE OF THE THYROID; CLINICAL RELATIONSHIPS
OF GRAVES'S DISEASE AND ACROMEGALIA.

BY JAMES J. PUTNAM, M.D.,

OF BOSTON.

CASE I. is that of an unmarried lady, now forty-eight years old, and always of delicate health.

I was first called to see her in December, 1885, and at the time of my visit the diagnosis was beyond question, even from her appearance alone.

She had taken cold while menstruating during a visit to the Philadelphia Exhibition of 1876, and it is possible that this was the starting-point of her sickness, though she was then pronounced only severely anæmic, and the myx-œdemic symptoms were not noticed until 1880 or 1881. The family history on the mother's side was markedly neurotic.

The face was clayey-gray, with a yellowish tint, the skin thick, stiff, dry, and coarse. The lips were protuberant and thick, and moved each in one piece, as it were, as she talked. The eyelids were swelled and alabaster-like in appearance, especially the upper, which overhung the eyes so that at times she had to throw the head back a little in order to see. The neck was thick, the hands were large, scaly, and dry, and a similar dry and coarse condition of the skin was everywhere present.

The nutrition of the teeth and nails was defective, and the hair had fallen out except for a few bunches here and there.

Formerly slender and with delicate coloring, she now looked overgrown and old. The limbs were large but not strong, and the skin was so inelastic and so tightly stretched over the legs below the knee, that the masseuse found it impossible to use the ordinary methods of manipulation. No true œdema was noted at this time, but at a later period the ankles pitted deeply on pressure. The swelling of the eyelids was partly watery, and increased during the night toward the side on which she lay.

The pulse was but 60; the heart-sounds free from murmur, but exceedingly feeble. There was a tendency of the head to droop forward, so that it was

with an effort that she held it erect. The voice was husky and the tongue thick. The gait was slow and insecure, so that she often stumbled and sometimes fell. She felt weak, and became breathless on slight exertion.

The mental condition was no less striking than the physical. An inconquerable inertia and apathy imprisoned her thought, feeling, and action, so that she could neither plan nor execute effectively, and every trifling duty seemed a mountain to climb; and yet her ineffectiveness did not fill her with real despondency.

Her friends would leave her with one boot on and the other in her hand, and return an hour later to find her in the same condition and attitude. Or what she held would slip from her grasp and she would not stoop to pick it up. Or, at times, she would lean in a stupor against the mantel-shelf, and remain motionless for one or two hours. The nearest duties often passed unfulfilled, and the thought of them failed to rouse her. Yet in spite of her slowness, and lethargy, and lack of initiative, she was neither melancholic nor demented, and would converse intelligently and pleasantly, though without animation, on many subjects. It is interesting to note (see below) that a certain degree of this apathy and slowness was characteristic of her temperament even many years before her illness began.

She slept all night, though often troubled with distressing dreams, but was constantly drowsy in the day. She suffered much from constipation, and later from hemorrhoids, and had an offensive expectoration, which no doubt contributed to give the breath the cadaveric odor which then characterized it.

The menstruation was at that time regular, but profuse; later it became very irregular, and was absent for months together, and her periods would leave her much weakened.

The urine was habitually very pale, and of low sp. gr., free from albumin and sugar. All the solid constituents were diminished, the amount of urea being 11.78 grm. to the litre (Prof. E. S. Wood).

The thyroid could not be felt. The skin was cool to the touch; and the temperature usually ranged around 95° F. Several times it almost touched 94°; and 97° was rarely, if ever, passed, even in slight sickness.

Blood-counts made during March and April, 1886, showed 3,120,000; 3,200,000; 3,234,000; 4,240,000. The proportion of whites was normal.

The next four years brought little change, except that in winter she would be worse, in summer better.

In the summer of 1891, however, a new symptom showed itself, namely, a synovitis with great external swelling, first of one knee, then of the other, brought on by a trifling shock or wrench, due to stepping heavily, the first time out of a carriage, the next time out of a horse-car. In one of the cases reported very early by Dr. Ord, the rupture of both patella tendons occurred in a similar manner, and the excessive swelling has been several times observed. The synovitis ran a very indolent course, and the appearance of the knee, with its thickened tissues, was so peculiar as to suggest the presence of some other process than simple effusion.

Up to the 1st of June, 1892, no treatment had brought material benefit, though persistent massage had given the patient much comfort. In June, 1892, I began a series of tri-weekly injections of a glycerin and carbolic extract of the sheep's thyroid, prepared as recommended by Dr. Murray.

Slight signs of improvement began to show themselves by the end of one or two weeks. In the course of six weeks the improvement in color, strength, and manner attracted the attention of everyone who knew her, even the children of her neighborhood, and was further confirmed by the appearance of a growth of fine hair all over the head, and a marked rise in pulse and temperature.

The temperature varied, but by the end of August, perhaps earlier, it ranged pretty constantly between 96° and 97° F. Menstruation, which had been absent so long, recurred in July, August, and September, but such recurrences had occasionally showed themselves, and it was still profuse and painful.

The swelling of the eyelids varied in amount, but during August it was almost absent, and that of the ankles had greatly lessened.

With the advent of the colder weather of September and October, I saw with regret that her improvement, hitherto steady, seemed to have suffered a check. She began to look pale and to feel languid, the swelling of the eyelids reappeared, and she complained of pain in the chest on slight exertion. Attributing this in part to an interruption of the treatment during the first ten days of October, I tried giving the injections more frequently than ever, part of the time almost daily, though at first without marked effect.

In November she began the treatment by the mouth, as recommended by Mackenzie and by Howitz, of Copenhagen, and took five or six sheep's thyroids a week (or more strictly, five or six lobes, as the sheep's thyroid consists of two separate lobes).

During the next month, and even after the final stage of improvement had been fairly entered upon, she complained much of a sense of thumping in her head, and while her mental condition was becoming steadily more natural, her appetite and strength seemed for a time rather to fail.

Ever since the outset of the treatment, she had noticed at times a sense of flushing and dizziness after the injections, such as has been noted in the reports of some of the English cases, but neither this effect nor the increased secretion of urine which others have noted was at all striking.

On December 9th, an estimation of the hæmoglobin by Fleisch's apparatus gave 55 per cent. Toward the end of December there was another period of depression in which she complained of increased thumping in the head and ears, and of nausea and languor, especially in the morning. These symptoms seemed at least partially attributable to an excess of thyroids, of which she had taken four glands a week, though these periods of depression did not invariably attend the use of the larger amounts.

This sense of illness was, however, attended by a rise of pulse and temperature rather than a fall, the pulse reaching 78 on December 18th, and the temperature 98°. And furthermore, it was plain that the whole character of her nutrition was becoming more normal, though it was not in all respects satisfactory. On December 21st, when I had not seen her for nearly three weeks, it was evident at the first glance that the condition of myxœdema was giving place to one of simple anæmia. She complained a great deal at this time of itching, which others have noticed likewise, perhaps from the action of the thyroids, but more probably from the changes taking place in the skin.

It was difficult to say whether she had actually grown paler or less pale, so unlike was her present complexion to that of the clay-like mask that she had worn so long. Unfortunately, she could not easily be weighed, but it was clear that she was rapidly growing thinner and slenderer, while her hands were becoming softer and more shapely. The clothes that she had worn were now hanging in folds, and in fact she became at this time really too thin, and with still further improvement she has gained flesh somewhat.

The opening of the new year was marked by her discarding her wig in favor of her new growth of dense and soft hair (now about four inches long) and by her beginning to take the thyroids in the form of powder, skilfully prepared by Parke, Davis, & Co., at my suggestion.

I had been in correspondence with them for this purpose for a number of weeks, and did not learn until later that similar methods were being adopted in Sweden and England. Fifteen grains of this powder represents one lobe of a sheep's thyroid. The taste is found nauseous by some patients, and does not disappear for many hours. These objections are mainly obviated by the use of capsules, or of keratin-coated pills, which do not dissolve in the stomach.

Not only had her face and figure by this time changed so that acquaintances occasionally failed to recognize her, but her voice had grown markedly firmer and clearer, and her manner alert and responsive.

An accurate examination of the blood made by Dr. J. J. Thomas gave the following result:

Reds . . .	5,700,000	{	Polynuclear whites	66.4 per cent.
White . . .	7,000		Mononuclear " .	21.6 "
			Lymphocytes .	10.04 "
Hæmoglobin	61 per cent.		Eosinophiles .	2.0 "

No increase in size of reds. A few myelocytes.

The menstruation recurred normally and almost painlessly in January, February, and March and April, appearing exactly at the expected date. For two weeks in February and March she took no thyroids, and toward the close of that time there were signs of a recurrence of symptoms, a firm non-œdematous swelling appearing in the legs above the ankles. The mental condition remained good, and on resumption of the thyroid powders the slight swelling soon disappeared.

Since the treatment was begun, the neck, waist, and arms have diminished about three inches in girth, and the old shoes and gloves have, so to speak, discarded themselves. She is still an anæmic and delicate person, as she always was, but as regards any distinct myxœdema she is practically well.¹

The temperature is usually normal, but occasionally runs half a degree too low.

CASE II. is that of a lady fifty-five years old, and is particularly interesting, both because the improvement was very rapid, and from the fact that previous to the onset of the myxœdematous symptoms, the thyroid was much enlarged, and moderate but constant tachycardia was present. The patient has been under the care of another physician, and I have seen her only incidentally except during the first period of the disease, when I tried for some time to reduce the size of the goitre by electrolysis. The case is also of interest from the fact that the patient's cousin and aunt had myxœdema in a pronounced form, and eventually died with it, the latter as an elderly person, the former in middle life. The aunt had been for many years crippled with rheumatoid arthritis.

The case seems to be one of those where an exciting cause of the disease may well have been anxiety and emotion, acting on an intense and sensitive temperament. The thyroid first began to enlarge about ten years ago. The tumor was unusually hard, much harder than the normal gland, and there were no vascular murmurs such as are often seen in Graves's disease. There was no exophthalmus, but the pulse was always moderately rapid—from ninety to one hundred and twenty. In view of the important question as to the possible relationship between Graves's disease and myxœdema, it is interesting to bear in mind that we have here a case where in the presence of a manifestly hereditary tendency to myxœdema, the first actual change was this thyroid disease, with at least one of the Graves's disease symptoms. (Perhaps, however, the tachycardia was purely reflex. See below.)

It is also a noteworthy fact that the patient's health failed considerably during the first period, and that besides dyspnœa, which may have been due to pressure, she suffered much from anæmia and debility. As her health had previously been good it is reasonable to suspect the thyroid disease as having been responsible for the falling off at this period, the more so that with the recent thyroid treatment not only the myxœdema but also the anæmia has for the most part disappeared. The myxœdematous changes first showed themselves two years ago, at the time of the menopause, and have been unmistakably characteristic; the presence of the alabaster-like swelling and pallor of the eyelids, lips, and face, the dryness of the skin, the increased size of the hands, the gross enlargement of the body, slightly subnormal temperature, thickness of the tongue, and slow speech leaving no doubt as to the diagnosis. The urine contained a trace of albumin, and occasionally a few casts. Mental changes have not been present.

¹ An examination of the blood made since this paper was written has shown that the anæmia has not improved of late, but rather grown severe, though in other respects the patient is doing well.

The treatment with the thyroid powder was begun about February 15th, since which time the patient has taken one powder of fifteen grains, which is the equivalent of one lobe of a sheep's thyroid, every second day.

The improvement was more rapid than in the first case, perhaps because the disease was less advanced and because the patient's previous health had been better. There is still some swelling of the legs, with ordinary œdema, but the patient's face has regained its delicacy and size and color of fifteen or twenty years ago. The thyroid is still large, though not so large as before. It will be very interesting to follow the condition of the urine in order to see whether the renal changes disappear. At present casts are still to be found, though they were absent in the three or four examinations made during the year previous to the beginning of the treatment.

I have also notes of three other patients who are taking the thyroids with benefit. One of them has acromegalia of rapid onset and typical form. No enlargement of the jaw is present, but the big hands and feet, rapid pulse, with tendency to palpitation and moderate muscular atrophy, place the diagnosis beyond question.

She came first to the out-patient department of the Massachusetts General Hospital, and was seen by Dr. G. M. Garland, who kindly gave me the opportunity of examining her. Later, she entered the wards, in the service of Dr. F. C. Shattuck, and there she improved somewhat under tonic treatment and sodium salicylate.

Some weeks after her discharge, however, I looked her up and found her still feeble and unable to work. Under fifteen grains of the thyroid powder every second day she has gained steadily, so that now, at the end of three weeks, she works with her hands for two hours daily.

Of the other two cases, one stands nearer to acromegalia, the other to myxœdema, though in both the diagnosis is doubtful. The latter is of especial interest from presenting atrophy of the optic nerves, which is more common in acromegalia than in myxœdema, though seen in the latter disease (Hun and Prudden, Wadsworth, Jones). The former is under the care of Dr. G. C. Stearns, of Leicester, but is taking thyroids at my suggestion. A letter received yesterday reports that the improvement goes steadily forward, both as regards general strength and the appearance of the face and lips.

There is a large swelling of the neck, probably a thyroid, which is diminishing in size under treatment; and, in fact, both patients consider themselves as decidedly better.

There are many questions of detail with regard to the new treatment by thyroid preparations which are of great practical importance. The following seem to me especially so:

Is the method by the stomach equally effective with that by injection, and is there anything to choose between the powder prepared

by evaporation, the gland itself, and the extract precipitated with alcohol as recommended by Vermehren?

Must the dose by the stomach be larger than that by injection, and, if so, for what reasons?

What is the cause and significance of the rapid loss of weight so often noted, and may it occur in ordinary obesity, or with healthy persons, under the use of thyroids?

What is the cause and significance of the other symptoms observed during the thyroid treatment, especially those of cardiac origin?

Are signs of renal irritation brought on or increased, and under what conditions?

Some of these questions can already be answered fairly well. The method by the stomach has not failed in any genuine case, and although one of the best of English observers at one time asserted that four or five times as large a quantity must be given to get the same effect as by subcutaneous injection, yet moderate quantities are sometimes so effective that we have no reason to conclude that any considerable part of the dose passes unabsorbed in most conditions of the stomach and intestine. Some good chemical or physiological test is, however, much needed to enable us to study these points and to compare the different preparations.

The loss of weight is an early sign of improvement, but it sometimes goes beyond the requirements of health; and this fact, coupled with the observations of Dr. A. Barron, of Liverpool, on the effects obtained in obesity,¹ suggests that the thyroid secretion may, under certain conditions, modify the tissue-changes even of healthy persons. A myxœdematous patient of Laache's lost more than nine kilogrammes, or about nineteen pounds, in three weeks, and my first patient must, at one time, have lost weight almost as rapidly.

Immediately after the injections, and even the stomach doses, of thyroid, there is sometimes a rise of temperature and pulse, increased secretion of urine, faintness or headache, and other symptoms; as the treatment goes on these symptoms may continue for a time, and may be associated with prostration, cardiac weakness; anginoid, neuralgic, or other pains (Laache), and even albuminuria (Laache). (Note also the increase in signs of renal irritation in my second case.)

¹ Dr. Barron has very kindly written to me that he has used the treatment in five cases of ordinary corpulence. One lost twenty-eight pounds in six weeks, three a moderate amount, and all lost more or less. I am trying it in two typical cases, but have no results to report as yet.

It is striking and important that these unpleasant signs sometimes last for weeks after the suspension of the treatment.

Dr. F. C. Shattuck will no doubt call attention to an important case which he kindly asked me to see with him, where attacks of palpitation with anginoid pain continued for several weeks after the cessation of a rather active, though short, course of treatment which had in other respects been remarkably effective for good. The fact that these effects last so long after the treatment by thyroids has been stopped, and that, on the other hand, they have failed to appear in some cases where large doses have been given, or at any rate do not necessarily appear at once (*Vermehren*) (my first patient has taken repeatedly thirty grains of the powder without noticeable effect), render it unlikely that they are wholly due to a direct action of the thyroid extract regarded as a drug. At any rate, other explanations suggest themselves as more probable.

One is that through an increased excitability of the cardiac centres, or from some other cause, the heart is called upon for increased action at a time when its muscular walls are in an abnormal state, or when its coronary arteries, which are liable to be thickened, are not supplying it with sufficient blood; another, that the products which are absorbed so rapidly from the diseased tissues act as irritants. It will be remembered that two of Murray's cases died while their improvement was in full progress, from sudden heart failure brought on by trifling exertion. One of these patients was known to have had cardiac disease, the other was assumed to have had a fatty heart.

At any rate, the action of the thyroid extract is not in all respects the same in health as in cases of myxœdema. Fenwick finds that diuresis does not occur in health, nor usually with myxœdematous patients unless they are under some slight excitement.

As regards the question of renal irritation, I would call attention to my second case, where, in spite of rapid improvement in other respects, the number of casts in the urine increased, and to Laache's case in which temporary albuminuria came on.

In another case, recently reported (*Holman*) the urine during treatment contained very large quantities of mucus.

Before leaving this part of the subject it must be noted that not only have the cases of myxœdema, successfully treated by animal thyroids, been gathering like a rising tide, but that myxœdematous cretins have likewise been shown to be susceptible of a considerable degree of improvement (*Bramwell, Affleck, Carnwick, Gibson*).

The point has not attracted as much attention as it deserves, that the "directly" hæmatopoietic functions of the thyroid, if they are of real importance, ought not to be met by ingestion of the thyroid secretion.

As a matter of fact, the anæmia of my first case does not seem inclined to pass away with the myxœdematous symptoms.

I shall confine myself, in what follows, to the pathological side of the subject.

To indicate, for reference sake, the percentage of frequency with which the different organs are diseased, I have arranged the results of the post-mortem examinations, including those published since 1888, in the form of a diagram, which, of course, must be taken as having only a relative and provisional value, since the autopsies are few, and the observations often incomplete and probably inaccurate.

I am not tempted to refer in detail to the varied anatomical changes to which the different organs are liable, because so little that is of fundamental importancè has appeared since the able paper of Hun and Prudden and the report of the Committee of the Clinical Society of London in 1888, and especially since the masterly review of the functions of the thyroid by Horsley in 1890. Two experimental researches are, however, worthy of special mention. One is that of Hofmeister, who removed in young rabbits the main part of the thyroid, but not the glandules of Gley. This is supposed to leave the rabbits practically uninjured, and, indeed, their health does not apparently suffer, though the hair is apt to become a little coarse and the body relatively short and thick.

In fact, however, a series of other changes occur. The growth of the bones is checked; the epithelium of the convoluted tubules of the kidney is altered; the ovaries undergo a premature ripening, with an immense development of follicles. The hypophysis cerebri enlarges, but the spleen and thymus do not, and no histological changes were found in the central nervous system or in any of the abdominal organs.

The second research is by Capobianco, of the University of Naples, and has reference to the condition of the nervous system in the acute stage of the cachexia after thyroidectomy in dogs. They are fully confirmatory of the older observations of Rogowitsch, and show clearly how profoundly the circulation and nutrition of the brain, the medulla, the cord, and the nerve roots may be altered. The fact that other observers have found only circulatory changes, with œdema

(see Horsley's paper) or swelling of axis cylinders (Kopp), shows that there are great differences in the degree to which these results are produced, but for this very reason we should scrutinize carefully before giving the verdict, "normal"; and the more so when we recall that changes in the electrical irritability of the cortex cerebri (Schiff, Horsley) and the peripheral nerves (Awtokratow, Schwartz) are found.

The discovery by Hodge, of Clarke University, that simple fatigue leaves its mark on healthy nerve-cells—even physiological fatigue, as that of bees after their day's flight—should be borne in mind in this connection. Not only do these observations show the possibility of recognizing slight changes in nucleus and protoplasm, but they point out—what is too little regarded—that in estimating the effects of poisons or of other causes of impaired nutrition upon the central nervous system, we ought to know what conditions as regards exertion and fatigue had been present shortly before death. A man or animal who has taxed his poor or poisoned nervous centres will certainly have induced histological changes that otherwise would be wholly absent, and the exertion necessary for this result may be an amount which would ordinarily appear trifling.

It would be extremely interesting to see Hodge's experiments repeated on animals with the cachexia thyreopriva. The probability that positive evidences of an increased liability to fatigue would be found is foreshadowed by the experiments of Manfredi Albanese, which point to an increased susceptibility to fatigue on the part of the spinal cord in the serious condition which follows removal of the supra-renal capsules.

No doubt the case is different for the *chronic stages* of myxœdema and cretinism.

We do not know about liability to fatigue, but no histological changes were found, at any rate, by Hofmeister in his rabbits, or by such careful observers as Hun and Prudden in their cases of myxœdema. There are no histological changes, indeed, that are distinctly characteristic of the nervous centres of cretinism (Bourneville), though the arrangement of the convolutions is often peculiar.

Langhans and Kopp have made a careful study of the peripheral nerves after thyroidectomy and in cretinism, and have found a series of interesting and peculiar alterations in the endothelial cells of the perineurium and endoneurium, as well as in the lymph spaces and the bloodvessels, arranged in minute foci here and there, especially in the

nerves. The paper is one for histologists to discuss. Langhans at first thought these appearances to be peculiar to goitrous diseases, but this is very doubtful (Schultze, and Langhans himself).

The blood presents no constant changes except those of acute anæmia, and in the acute stages increased venosity (*v.* Horsley). The red cells have been found larger and also smaller than normal; the proportion of whites increased and normal; eosinophiles increased in one case (Ehrlich); myelocytes present in one (Case I.).

As to the final cause and nature of the changes which constitute myxœdema and cretinism, that is a riddle the solution of which we can approach but cannot reach. That the blood becomes toxic is inherently probable, and is confirmed by the fact that although usually harmless¹ if transfused into healthy animals, it precipitates the cachexia in the case of animals deprived of their thyroids (Fano, Zander, Rogowitsch, Fuhr); while, on the other hand, the cachexia may be mitigated by the infusion of healthy blood. Gley asserts that the toxicity of the urine is also increased.

The skin, the kidneys, the ovaries (Hofmeister, Langhans), the liver, the heart and pericardium, and other organs and tissues, also show signs of irritation and sometimes of degeneration. This is doubtless sometimes mucinoid in character, but mucin has not always been found, even in the skin, and Jürgens shows how complex the change which we call mucinoid really is. We do not yet know whether mucin, when it does occur, is merely a sign of degeneration or whether it is itself a poison. That it is the chief or only poison in myxœdema is highly improbable.

There are, moreover, some phenomena which seem to be less easily explained as the result of irritation and degeneration than as evidences of a sort of variation in structure, analogous, perhaps, to that which follows castration.

The curious fatty tumors of the neck so characteristic of myxœdema and myxœdematous cretinism are not easily accounted for as results of irritation; the changes in the ovaries of Hofmeister's rabbits were interpreted by him as a sign of follicular hypertrophy or premature ripening; the myxœdematous cretin is not only a diseased and degenerate individual, but may be regarded as a different variety, and this appears even in his mental characteristics.

If one looks for other instances of alteration of type with which to compare this, the most striking and, possibly, the nearest is that

¹ Gley finds the blood of dogs after thyroidectomy to cause convulsions in rabbits.

of eunuchism from castration, by which the bull is changed to the ox, and the cock to the capon. The analogy would be more significant if it could be shown by experiment that the effects of castration could be prevented by frequent injections of testiculin; indeed, the analogy would not hold if the results of this experiment turned out negative. So far as I know, it has never been tried, but it seems to me a reasonable experiment, and a logical outcome of the suggestive observations of Brown-Séquard and D'Arsonval.

The next point to which I wish to call your attention is with regard to the incomplete or partial forms of the thyroid cachexias.

The attention of physiologists and pathologists has hitherto been mainly directed to the study of the diseases due to complete, or nearly complete, destruction of the thyroid; and the opinion is current that the functions of the gland may be as well performed by a part as by the whole, because it has been found that when a piece of any considerable size is left, the cachexia does not, as a rule, occur. Usually the remaining piece grows larger. Sometimes the accessory glandules, which are ordinarily embryonic in character, also increase in size, and probably in efficiency, though they never grow to the size of the original gland. A compensatory enlargement of the hypophysis cerebri may also, it is thought, occur.

An additional argument that a part of a thyroid will serve for the whole is apparently furnished by the recent experiments of Beresowski. He removed enough of the gland to cause cachexia, and found that in the course of a few days distinct processes of repair had set in, as indicated by karyokinetic division of the glandular epithelium. This hyperplasia ceased, however, long before the piece of the thyroid had reached the full size of the gland, and the reason for this was supposed to be that the vital needs of the gland had been met.

In spite of the large amount of truth in these generalizations, it is in order to inquire whether we really have sufficient grounds for believing that the thyroid is so unnecessarily large, and, if this is not the case, whether we may not learn to discover and relieve diseased conditions associated with a partial destruction of the gland.

It is important to note, as indicating the complex nature of the problem, that myxœdema may fail to occur even when the true glandular epithelium of the thyroid has been replaced by a cubical variety, apparently secreting no colloid; and, indeed, a small part of a gland so altered may suffice. This is illustrated by the history of a case of Graves's disease reported further on in this paper, and by the experiments of Halsted and Welch upon dogs.

As regards the argument drawn from the cessation of the compensatory hypertrophy at a certain point, it seems to me extremely improbable that the amount of regeneration is exactly proportional to functional requirements. The law of repair is more complicated than this, and that is indicated in the present case by the fact that Ribbert found a true regeneration to follow the removal of comparatively minute pieces of the thyroid (see also Neumeister).

It would be an interesting research to see how much, or rather how little, of the thyroid must be removed before changes in growth and nutrition can be detected, especially in the light of Hofmeister's experiments, which show that rabbits may present them in spite of retaining, by the aid of their carotid glandules, apparently good health.

The studies of dosage during the treatment of cretinic children by sheep's thyroids, will no doubt throw much light upon this matter of the amount of thyroid secretion needed for full compensation, and meantime some clinical evidence is already forthcoming to show that the amount of thyroid sufficient for life, and fair health, is not necessarily sufficient for all the functions of the gland.

Some of the most important forms of cachexia from thyroid disease, not severe enough to cause myxœdema, are the following:

1. The early history of myxœdematous patients sometimes gives evidence of the presence of analogous forms of degeneration.

Two cases have been reported within a few years (Loewy, Merklen), where myxœdema came on when the patients were between twenty and thirty years old; yet both were of dwarf-like stature, and presented certain slight mental peculiarities which, without stamping them as cretins, suggested a congenital deficiency of thyroid action.

Struck by these cases, I turned to the abstracts published by the Committee of the Clinical Society to look up the early history of the patients who became myxœdematous before their twentieth year; that is, cases of myxœdema belonging to the period antecedent to senile involution, and I found these histories, incomplete though they are, to be of much interest. Four such cases are recorded, and in at least three of them, in spite of the scanty record of antecedents, there had been signs of degeneration, such as very low bodily weight; slight mental weakness; small, broad, and depressed nose; and extremely large tongue, indicating, perhaps, as in the cases first cited, a partial and unrecognized cretinoid state existing since childhood.

It is noteworthy that my first patient was not only anæmic and lacking in robustness, during her early life, but also showed some degree of the lethargic temperament which afterward became so very marked.

2. Cretinism is a disease of many degrees, and some of the cretins show a fair intelligence, a few a first-rate degree (comp. Bircher, and a celebrated case cited by Langhans). Yet their skulls are of the type now considered as probably, or possibly, characteristic of thyroid disease. In myxœdematous cretinism, which is the lowest type, characterized by unossified fontanelles and synchondroses (occasionally premature ossification), dwarf-like stature, tendency to umbilical hernia, etc., the thyroid is greatly atrophied, sometimes absent. In other forms the atrophy is only partial (Hanau), and portions of the gland may look healthy. Furthermore, the removal of a cretinic thyroid may cause myxœdema (Bircher).

3. Goitrous persons, in districts where the disease is endemic, are generally of inferior type, though, of course, it is not certain that the thyroid disease is the cause of this.

In my second case, which is probably typical of others, it is worth considering whether the anæmia and debility of the pre-myxœdematous, but goitrous, period may not have been an early stage of thyroid cachexia.

At any rate, myxœdema sometimes comes on quickly, but oftener slowly, and in the future it will be of great importance to learn to recognize the preliminary symptoms.

Another fact, of which we should never lose sight, is that myxœdema, or tetany, and perhaps other signs of the thyroid cachexia, may follow temporary disease of the thyroid, from which the patient eventually recovers, and may then pass away. Not only does this happen after partial thyroidectomy, but in the course of syphilis (Kocher), and as a result of ordinary goitre (*v.* Horsley's paper, 1890, *Brit. Med. Journ.*, 1890.)

As regards the question of the compensatory hypertrophy of the hypophysis, it is certainly true (Rogowitsch, Stieda, Hofmeister) that thyroidectomy done on dogs and rabbits is usually followed by enlargement of the hypophysis, which comes so near the thyroid in structure and origin, and it would seem also that the thyroid may enlarge after removal of the hypophysis (Vassale and Sacchi). On the other hand, it is not accepted as certain that this enlargement means increase of functional activity.

To express a complicated matter in a few words, it is generally conceded that the hypophysis contains two kinds of cellular bodies, the "chromophiles," and the Hauptzellen (Stieda and Rogowitsch), or "nucleated protoplasm" (Schönemann).

When the gland enlarges there may be found an increase in the number of chromophile cells, or an enlargement of the Hauptzellen; and there is almost always an increase in the colloid contents of the gland. The increase of the chromophile cells has been thought (Lothringer, *Arch. für mikroskop. Anat.*; cited by Vassale and Sacchi) to be of functional significance; but Schönemann, on the basis of a careful study of the hypophysis of a cretin, came to the opposite conclusion, namely, that the chromophile cells are degenerated forms, and are finally to be converted into colloid.

Vassale and Sacchi have recently made an ingenious experiment which seems to favor the view of Schönemann. Removing the hypophysis from an ox, they divided it into two parts; and while one of these was preserved in alcohol for comparison, to indicate the normal histology, the other was introduced into the abdomen of a rabbit and left for three days, presumably to undergo slow degeneration. The chromophile cells in the latter half were found to have increased greatly in number.

The same observers deny that the mere increase in colloid matter ought to be taken as a sign of increased functional efficiency, either in the case of the hypophysis or the thyroid, unless it is accompanied with indications of active cell-growth of the glandular epithelium, with karyokinetic appearances, and this, they declare, does not occur in either organ simply from extirpation of the other. They do, however, regard the two organs as physiologically similar, and this is important for the pathology of acromegalia, which seems to me a disease kindred to myxœdema, though the bond may be but that of a Scottish cousinship.

Hofmeister's experiments, which are especially valuable because his rabbits remained alive and well, and the hypophysis was given from three to six months in which to show its supposed compensatory growth, are confirmatory, as he thinks, of the observations of Rogowitsch and Stieda. He finds, as they did, not only an enlargement of the whole organ, but an increase in the size of the Hauptzellen.¹

¹ There are several reasons for concluding that the colloid is not the important part of the thyroid secretion, but an envelope, or a by-product. Even its presence is not essential.

The valuable researches of Halstead and Welch, made some years ago, but not yet

The question is therefore still open for further research, but hereafter increased size cannot be taken as a sure sign of increased efficiency.

One suggestion thrown out by Hofmeister is worthy of comment, namely, that the large size of the sella Turcica, several times noted in cases of cretinism, indicates that the hypophysis had been hypertrophied. Klebs makes the same remark with reference to a case of acromegalia. As bony changes are, however, of regular occurrence in both of these diseases, the increased size of the sella Turcica admits of a different interpretation, and Schönemann distinctly notes that while the sella Turcica of his cretin was large, the hypophysis was rather small. Possibly it had been enlarged at an earlier period. Certainly the hypophysis is not always enlarged either in cretinism or myxœdema *at the period at which the post-mortems have been made.*

It is next in place to consider what other symptom-complexes, besides myxœdema, are associated with disease of the thyroid, and in what that association probably consists.

The diseases to be considered are exophthalmic goitre, acromegalia and certain forms of obesity.

1. The reasons for ranking Graves's disease among the thyroid cachexias were clearly set forth and ably championed by Moebius in 1891, and since then various writers have taken sides in the discussion (*v.* the abstracts by Moebius himself in Schmidt's *Jahrb.* for the past two years). Especially valuable are the monographs of Wölfler, of Gratz, and the able paper of Wette, who has had a large experience with thyroid diseases in all their aspects, as assistant in the surgical clinic at Jena.

It must certainly strike anyone who studies the matter, that there is a certain likeness between the acute nervous symptoms of the first stage of the cachexia following either complete or partial thyroidectomy, and the nervous symptoms of Graves's disease; and, on the other hand, a certain contrast between the latter and some of the symptoms of chronic myxœdema. This argument from the comparison of symptoms does not, however, fully stand close criticism.

published, show that in the regeneration of the thyroid which follows mutilation, the histological character of the gland may undergo great change. The epithelium tends to become high and cubical, instead of flat, and the colloid to disappear. Eventually the whole gland may be made to show this change. (See Trans. of the Assoc. of Amer. Physicians, 1893. Discussion on Myxœdema.)

A closely similar change has been noted by Councilman in a case of Graves's disease described farther on, yet this patient was not myxœdematous.

There is no real contrast, for example, between the sweating of Graves's disease and the dry skin of myxœdema, if the former is due, as is probable, to central excitation of the sweat nerves, and the latter to disease of the cutis.

It may be true that there is an analogy between the nervous erythism of the first stage of the cachexia thyreopriva and Graves's disease; but if this be so the cause is not evident. For in the one case we have to do with symptoms associated with absence of the thyroid, while in the other we have to do with symptoms associated with the presence of an enlarged thyroid, and actually curable, sometimes, by thyroidectomy. It is possible that irritation of the vagus and sympathetic is a factor common to both cases.

But there are other arguments of greater weight in support of the thyroidal theory of Graves's disease.

In the first place, myxœdema sometimes closely follows Graves's disease, or even, perhaps, accompanies it (Sollier; Von Jaksch, cited by Gauthier; *Clin. Soc. Reports*; my own second case), or the two diseases may occur in different members of the same family (Hadden, Virchow). Above all, thyroidectomy, or other operations on the thyroid, have proved of late years unexpectedly successful in the treatment of Graves's disease. Thus, Lemke has collected thirty-seven cases treated in this way, in all but three or four of which improvement or cure resulted. To this number I can add one case, which is, I think, the first to be reported in this country.

The operation was done by Dr. J. C. Warren, at the Massachusetts General Hospital, three months ago. The patient seems to be steadily, though slowly, improving. The whole gland seemed to have been converted into a firm mass of adenomatous structure, with high cubical epithelium, and, so far as examined, without colloid. (Councilman.)

The probability of a connection of some sort between Graves's disease and myxœdema is made stronger by including the case of acromegalia, which bears a certain likeness to both of the others, presenting the rapid pulse, the tremor, and the sweating of the skin characteristic of Graves's disease; together with trophic changes in the bones and integuments of the head and limbs analogous, perhaps, to those of myxœdema.

On the other hand, the experimental evidence with regard to the cause of Graves's disease, unsatisfactory as it is, favors rather strongly the view that it is due to the injury of certain nervous arrangements; and no theory should pass muster that does not attempt to account

for the extraordinary manner in which practically the whole Graves's disease complex springs almost instantaneously into existence in persons with healthy thyroids under the influence of intense emotion. Sometimes, if the emotion quickly subsides, the symptoms may soon pass away (Gowers. My colleague Dr. F. Coggeshall has seen an exactly parallel case. The patient was a young girl, and the symptoms followed immediately on great excitement attending a whipping, but subsided in a few days.)

My own opinion as regards this complicated matter is that some such statement and explanation as that given by Wette is correct, but may be extended and modified. He thinks that goitre is one of the most important causes of Graves's disease, but not by any means the only cause; that the goitre may excite the cardiac and ocular symptoms, either by direct irritation of fibres of the cervical sympathetic or by indirect irritation of the sympathetic centres; and that many of the general nervous symptoms are due to the action of toxic substances formed by disordered metabolism within the diseased gland.

The explanation which would be most satisfactory is one which would include this, and at the same time cover the cases where Graves's disease comes on without antecedent thyroid disease, and I think that such an explanation can be hinted at if we do not take our physiology too narrowly.

The most probable hypothesis, though it can only be stated with infinite crudeness, seems to me to be as follows:

The Graves's disease complex, in common, probably, with most other neuroses, is the distorted correlative, or caricature, of one or several physiological arrangements (comp. London *Lancet*) in which the nervous system plays the central part. The thyroid has an abundant and mobile circulation, and is supplied with nerves from the vagus and sympathetic. It is thus in position to inhibit (as occasionally seems to occur: see Wette) or to accelerate the heart, and on the other hand it is liable to swell almost like an erectile organ when the heart is acting strongly and its own vasomotor apparatus is weakened. When enlarged, the thyroid, the sympathetic, and the other nerves in its neighborhood thus again act as a centre of disturbance. These results almost certainly occur in many cases of thyroid disease (comp. Wölfler, Wette, and an able paper by Schranz, which I regret my lack of space to cite at length). It is even conceivable that one of the functions of the thyroid in health is to act as a regulatory apparatus for the heart, and it is further conceivable that there is a quasi-physiological connection of the following

sort between the tremor and exophthalmus of Graves's disease, the disordered action of the heart, and the disease of the thyroid:

When a person is suddenly called upon for close attention, he fixes his eyes and holds his breath, his muscles stiffen, and his heart beats faster. If the attention changes to rage or fear the eyes open wider, the heart palpitates, the voice changes, the hand trembles, the face and neck may become turgid from vasomotor paralysis, and even the circulation and secretion of the bowels may become affected.

As calm is restored these symptoms may pass gradually away, but the heart is slow to recover its tone. Judging from the fact that Graves' disease may immediately supervene on such events as this, we may assume as possible that the heart sometimes never recovers its tone, and that the delicate vascular apparatus of the erectile thyroid (which Schranz makes largely responsible for the origin of goitre) is also liable to suffer permanently.

Eventually, nutritive changes may occur (deposition of fats in orbits, etc.); and a morbid complex of symptoms, interdependent and correlated with each other, is formed, and becomes crystallized into what we call a disease.

When any member of this complex is induced, the others are likely, by association, to follow, and a tendency to the complex as a whole may possibly be inherited like a tendency to any other disease, or to a monstrosity. The exciting cause may be any one of many.

Tachycardia without exophthalmus or tremor occurs so frequently with ordinary goitre that it hardly deserves to be called abortive Graves's disease, but it may at least be an analogous affection.

The operation of thyroidectomy in Graves's disease—which, by the way, may be successful when it consists only in the removal of a sarcoma (Tillaux) or a cyst (cited by Gauthier)—may be supposed to act by breaking in upon the vicious circle of influences through which the disease is maintained. The extirpation of a part of the growth usually causes the rest to shrink (Wolff), just as iodine or external cauterization, or electrolysis, or division of the isthmus of the thyroid may cause the same result, and it is probably this and not the reduction of the thyroid secretion by removal of part of its secreting tissue that makes the operation of value. A new set, as it were, is given to the action of the nervous centres, such as more favorable mental surroundings may give, and in favorable cases the old equilibrium is restored. It must not be forgotten that it is just as possible to produce this result from one side as from the other. Absolute

repose for the nervous system, if it can be secured, as it sometimes can, is occasionally as effectual in causing the disappearance of the goitre as the thyroidectomy is in quieting the nervous excitement and the heart.

It is not probable that Graves's disease is related to the functions of the thyroid as a trophic organ, or, at any rate, that it is due to either an increase or a diminution of the normal secretions of the gland. That it is not due to an increase of the normal secretion is demonstrated both by anatomical considerations (coexistence with a small or practically small gland) and by the fact that the myxœdema, which is not compatible with an increased secretion of the thyroid, sometimes follows closely on the heels of Graves's disease, or even accompanies it. Neither can we refer it to a diminution of normal secretion, or we should meet it more often in connection with the involution of the thyroid. Moreover, it has often happened that all the symptoms of Graves's disease have come on with extreme suddenness, in consequence of strong emotion, in persons with normal thyroids, and have again disappeared almost as quickly. Again, it apparently is not cured by preparations of thyroid extract.

It is possible that disordered metabolism, due to a vitiated thyroid secretion, helps to keep up the nervous symptoms of Graves's disease, but this theory is in need of more evidence than it has yet adduced.

Acromegalia probably stands as near to myxœdema and diseases of the thyroid or kindred organs as Graves's disease, if, indeed, the bond be not closer.

It is more distinctly a sort of dystrophy than Graves's disease is, and affects much the same parts that are involved in myxœdema, namely, the bones and integuments of the face and extremities, and eventually, perhaps, of the whole body; for, as Klebs points out, the reason that the ends of the long bones show the growth the most is that the resistance there is least.

The growth of the hair and nails is apt to be impaired in acromegalia, though not to the same extent as in myxœdema, but, on the other hand, the skin often perspires freely, as in Graves's disease. Tremor is also common, and attacks of well-marked palpitation are of frequent occurrence.

In the case of a middle-aged woman, recently under observation in the wards and now in the out-patient department of the Massachusetts General Hospital, I found the pulse one morning 180,

though from her phlegmatic appearance I should not for an instant have expected this. She had, to be sure, taken a dose of thyroid powder two hours previously, but on another occasion when she had not done this I found the pulse 120, and during her stay in the hospital, under the care of Dr. F. C. Shattuck, it ranged from 90 to 100, though she was kept perfectly still.

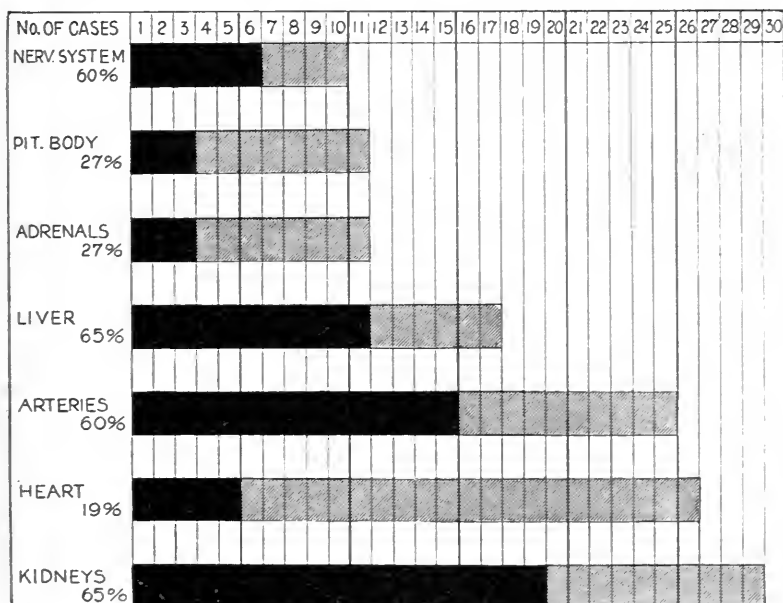
Klebs, who has studied the pathological anatomy of acromegalia quite extensively, explains the rapid pulse on mechanical grounds, believing that the disease originates in an affection of the thymus and that vascular changes occur by which the labor of the heart is increased. It would not be fair for one who is no pathologist to offer a criticism of this theory in detail, but with the tachycardia of Graves's disease before our eyes it would seem more reasonable to seek a physiological than a mechanical explanation, as in the case of Graves's disease. I do not, however, mean to deny the importance of the thymus, or to maintain that acromegalia is distinctly of thyroid origin like myxœdema. I cannot dwell, for want of space, on the recent views of Marie and Marinesco, or on those presented in the monograph of Duchesneau, published in 1892.

Duchesneau calls attention especially to the occasional occurrence of muscular atrophy, but the theory by which he accounts for it, namely, pressure of hyperplastic connective tissue on the nerve roots, is not, I think, the true one. This atrophy is present in a typical form in the case recently at the Massachusetts General Hospital, though without other signs of nerve-root pressure, but so, also, is it present in a case of Graves's disease which I have had the opportunity of studying closely for many years, and in several other reported cases of that kind. The explanation given by Duchesneau would certainly not apply here, and, on the other hand, the occurrence of the atrophy in both these diseases forms another bond of union between them, though its nature is still so obscure.

I have said nothing as yet of disease of the hypophysis in acromegalia, and to save time I present the evidence on that point in the form of a table and diagram.

It is not certain that the dystrophic affections due to thyroid diseases are fully covered by myxœdema and the others that have been mentioned; and in this connection three communications, two by Dr. F. X. Dercum and one by Dr. F. P. Henry, in 1888, 1890, and 1892, are especially important. They describe three interesting cases, characterized by great and widespread hyperplasia of the sub-

cutaneous fat, especially accentuated at certain parts of the body, and attended by pain and muscle-degeneration indicating the presence of neuritis. Perspiration was diminished or absent, and in this and other respects the cases suggested myxœdema. That which makes them especially interesting, however, is that the thyroids of two of the patients, who died while under observation, were indurated and infiltrated with calcareous deposit.



The black portion represents the number of cases in which lesion was found; the shaded portion the number of cases in which the organ is stated to have been normal. In the other cases no statement was made as to the organs. The line at the top gives the number of cases. The percentages are given in round numbers.

The name first suggested for this disease by Dr. Dercum was "A Subcutaneous Connective-tissue Dystrophy of the Arms and Back, Associated with Symptoms resembling Myxœdema." Dr. Frederick P. Henry first described the second of the three cases, and proposed the name "Myxœdematous Dystrophy." Dr. Dercum, in his final communication, says:

"All of these cases lack the peculiar physiognomy, the spade-like hands, the infiltrated skin, the peculiar slowing of speech, and the host of other symptoms found in true myxœdema.

"It would seem, then, that we have here to deal with a connective-tissue

dystrophy, a fatty metamorphosis of various stages of completeness, occurring in separate regions, or, at best, unevenly distributed, and associated with symptoms suggestive of an irregular and fugitive irritation of nerve-trunks, possibly a neuritis. That this, however, does not embrace the whole truth is evidenced by such symptoms as the diminished sweating, the headache, and the contraction of the visual fields noted in Case I.

"Inasmuch as the swelling and the pain are the two most prominent features of the disease, I propose for it the name 'Adiposis Dolorosa.'"

Dr. Dercum further makes the good suggestion that the condition of the thyroid gland should be examined in all cases of obesity. The thyroid is rarely examined as a matter of routine, and least of all microscopically, unless attention is especially called to it, so that our knowledge of the frequency with which this or that change is present, or as to the amount of variation in structure which is compatible with health, is still but slender.

A year ago Dr. F. C. Shattuck was good enough to ask me to see with him a very interesting case which deserves a place in some such category as this, if not indeed a case of myxœdema, though, I believe, the improvement under thyroid treatment has not been very marked, except as regards the condition of the skin. The patient was a lady of about twenty, and the signs and symptoms consisted mainly in an increase in the subcutaneous fat, with changes in the skin not quite suggestive of obesity and somewhat suggestive of myxœdema, a change in the nutrition of the palms and soles, and a marked and peculiar discoloration and brittleness of the nails, associated with an irritability and excitability which finally developed into insanity. I trust that Dr. Shattuck will report the case at greater length.

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A CASE OF LOCAL CATALEPSY; AN UNDESCRIBED HYSTERICAL DISORDER.

BY JOHN K. MITCHELL, M.D.,
OF PHILADELPHIA.

THE following very curious case presents, so far as I have been able to discover, an entirely undescribed group of symptoms, so strange and so interesting that it seems worth while to publish it, even as a solitary example. The possible hysterical origin will be discussed after the relation of the history and present condition.

Miss A. B., aged seventeen years, native of Pennsylvania, unmarried, was seen March 28, 1893, when the following history was obtained. Her general health had been excellent until the beginning of the present disease. Menstruation appeared when she was sixteen, and has returned at irregular intervals twice or thrice since, without pain. She is plump, ruddy, and strong-looking. She is not in any way nervous or hysterical, and her habits of life have been good and simple.

About the month of December, 1891, her school-books once or twice fell from the left hand, as if the member were tired and could not retain them. This happened again several times, with intervals of perfect use. There was no pain.

In April, 1892, on the ulnar surface of the third, and on the adjacent side of the little finger of the left hand, there appeared sundry small blisters or blebs containing serum, which caused some itching and came and went several times. In July, of the same year, she received a slight cut with a knife at the root of the left thumb. The hand swelled much; there was aching, redness, and heat. A poultice was applied, and an abscess presently discharged at the site of the cut; there was a good deal of suppuration, and the wound healed slowly in three weeks. All the fingers then gradually became stiff, and have so remained ever since. Other blebs were also formed on both sides of the wrist.

Examination.—The hand is strong, large-boned, of good color, and not wasted in any way. The usual and most comfortable position is with the wrist half extended, that is, in a straight line with the forearm, all the fingers in semi-flexion, the little finger slightly adducted on the palmar surface of the third finger, the thumb in close contact with the palmar surface of the index finger, and all rigidly held like the “lead-pipe” condition. The position of the hand is thus precisely that of the “obstetric attitude.”

FIG. 1.



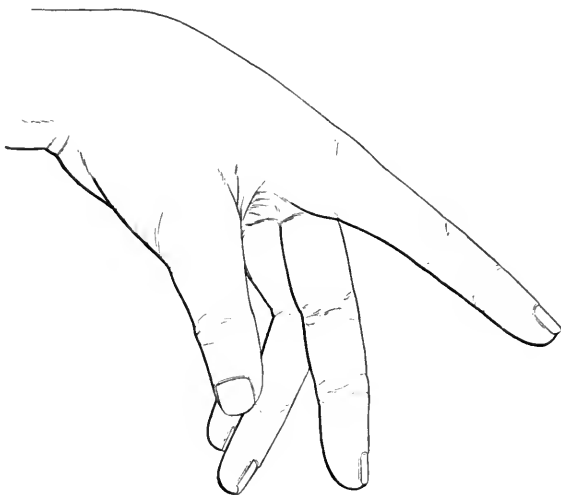
Usual position of the hand at rest.

Slight twitching can be felt in the muscles of the forearm, and in the thenar and hypothenar eminences. All voluntary motions of the wrist are preserved, but none of the fingers. If the wrist be passively and rapidly flexed and extended, the motion, at first easy, soon becomes more difficult, and a similar rigidity to that of the digits possesses it; even then it readily performs voluntary flexion and extension. The fingers may be placed in any position, even the most unusual, and will remain almost indefinitely in the posture thus given; they may be passively

moved with much greater difficulty than would be found in moving the fingers of an ordinarily muscular person against his resistance. The opposition is constant, the stiffness yielding slowly and steadily, not suddenly or with a jerk. Untouched, they continue exactly as placed, like the members of a jointed doll.

The sketch made by Dr. Taylor shows a position in which the hand remained for thirty-eight minutes.

FIG. 2.



At times this rigidity affects the wrist also. The wrist bends best (voluntarily) in flexion, and if the digits are flexed the wrist cannot readily be extended. Whether the fingers are flexed, extended, abducted, or twined about one another, it is with equal resistance, and though, as has been said, they may remain an unlimited time in this position, yet if it be a strained one, and especially if they are in extreme extension, the patient herself places them with the free hand in the semi-flexion of the obstetrical attitude, because the strained extended position causes pain in the wrist.

Sometimes the fingers of themselves pass slowly into extreme abduction, and so remain for a while, gradually returning to what I may call the "normal state" of semi-flexion.

The sense of pain is lost in the whole left hand as high as the annular ligament, where it suddenly becomes acute again. Below this a slight pin-prick does not bleed; there is no sense of touch, localization, or temperature change. There is no tenderness over the nerve tracks in the arm, with this single exception, that there is one minute area of pressure-pain in the middle of the flexor surface of the wrist, just above the annular ligament, over the median nerve's course.

All sensation is perfect on the right hand and arm.

The patient insists that the nails of the affected member have not grown enough in three months to require cutting, but they are not ridged or brittle.

An electrical examination very carefully made at the Infirmary for Nervous Disease revealed no differences of contractility between the two sides.

On a later visit the patient's mother stated that she had particularly noted, as requested, the position of the affected hand during sleep, and found it always rigid in the attitude first described. At Dr. Weir Mitchell's clinic, at the Infirmary, where the patient was sent to be shown to the class, it was noted that the hand was kept forty-one minutes in the strained position in which it was placed, the patient then moving the fingers with the right hand to an easier position.

To help determine the element of hysteria in the case, the girl's eyes were examined by Dr. G. E. de Schweinitz, who reported the result as practically negative. Visual acuity in each eye, 6/7.5; corneal astigmatism according to the rule 0.50 D. in each eye; amplitude of accommodation, 8 D.; insufficiency of the external recti (esophoria), 1 degree; insufficiency of the vertical muscles (right hyperphoria), $\frac{1}{2}$ degree; each optic disk a vertical oval of 90 degrees, more pallid, especially in the deeper layers, than is normal; veins natural in size, arteries in comparison slightly smaller than normal; no pathological changes in retinas or choroid; pupillary reflexes normal; conjunctivæ not insensitive; form fields normal in extent, and in sequence of color appreciation.

There is no pain or tenderness in the spine. Knee-jerk normal. Heart and lungs normal, and all secretions healthy and well performed.

While the general character of the case is analogous to the condition of contracture or rigidity commonly seen in hysterical states, the rigidity is very different from that of the usual hysterical contracture where there is a retention of one fixed position with entire or almost entire immobility. The loss of sensibility is so complete, and the line so abrupt, as to point to an hysterical origin, and the absence of bleeding from pin-pricks is a well-known hysterical symptom. Negatively, too, besides the character of the stiffness, there is lack of any evidence of neuritis or of degenerative nerve change, and every nerve of the hand is involved, from the wrist-joint to the finger-tips.

The conclusion must, I think, be that it is hysterical, in spite of the absence of stigmata, mental or physical.

It is difficult to find any name for such a state, which will include or suggest all the symptoms, and it is, I believe, a hitherto undescribed condition. The wax-like or lead-like rigidity maintained in any given position, and the loss of sensibility, remind one of the cataleptic state. Catalepsy, however, is a paroxysmal neurosis; loss of consciousness, partial or complete, attends its manifestations, and in decided cases it is nearly always associated with epileptic or hysterical disease. This patient's local morbid state is unvarying; it is present even in sleep. I have been unable to find anything exactly similar described by any author. Dr. S. Weir Mitchell, Prof. C. K. Mills, and Dr. M. J. Lewis, all of whom examined her, were all of the opinion that the case might properly be held unique. Until some better name shall be found, I have ventured to call it "local catalepsy."

CHLOROMA AND ITS RELATION TO LEUKÆMIA.

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"La publication des faits rares et curieux est toujours chose utile, ne fût-ce que pour indiquer aux médecines une nouvelle cause d'erreur, un nouvel écueil sur lequel leur expérience peut faire naufrage. Néanmoins, tant qu'ils sont isolés, les faits de ce genre ne peuvent être considérés que comme des pierres d'attente, et ils réacquièrent de véritable importance que lorsqu'en les rapprochant de faits analogues ou identiques existant déjà dans la science, on peut les faire servir soit à constituer une espèce morbide nouvelle, soit à circonscrire, à délimiter une forme particulière de maladie offrant dans son aspect ou dans sa marche quelque chose de special."—ARAN.

SOME time ago I had a patient in what seemed to be the last stage of leukæmia. After death the new growths, which differed in their localization from those usually found in leukæmia, had a color so distinctly green, as distinguished from the greenish tint often seen in leukæmia, that the question arose in my mind whether the cases of "chloroma" previously reported were not leukæmic.

Not knowing that the question had already been raised, I hoped at the best to find in the original descriptions of the cases something bearing out my idea. Soon after beginning researches in the literature I discovered that my idea was not new, but had been expressed by Von Recklinghausen.¹ But, on continuing the search, I found the question by no means settled, and, as the subject has an interest far beyond the peculiar color or the rarity of chloroma, I give the results not only of the study of my own case, but also those of an exhaustive examination of the literature.

My patient was a lad (L. C.) fifteen years and nine months old. His family history, as far back as the grandparents, was without bearing on the case. He had whooping cough at three years, mumps at eleven, measles at thirteen. He never had malaria nor lived in a malarial locality. With the exceptions named, was perfectly well up to the time the present illness began. He went to school until December, 1891, when he was allowed to stay away on account of pains in his eyes while studying. At that time there was nothing abnormal in the appearance of the eyes. About the same time, before Christmas of 1891, the mother noticed that the boy, who had before a good color, was very pale. He was given quinine, presumably as a tonic. Soon after, marked shortness of breath began, with palpitation of the heart on exertion. Even before the end of the year dyspnœa was so marked that the boy "got out of breath after walking to the barn, a distance of 'about a block;' and going back, up a slight ascent, he had to stop at a stile to get his breath." At that time,

¹ Ziegler, in his Lehrbuch, 5. Aufl. i. p. 237, says: "Von Recklinghausen (Tagebl. d. Naturforscherver. in Strassburg, 1885) zählt das Chlorom in die Gruppe der hyperplastischen Lymphome (Leukämie, Pseudoleukämie, multiple Myelome) von der sie eine Spielart darstellen."

i.e., before Christmas, the mother thinks, the boy was as pale as on admission. The dyspnoea continued and became so severe that, two weeks before admission, the patient was given a bedroom on the ground floor, as he could not go up stairs without great discomfort. He never had nose-bleed before this disease came on, but since then has had three attacks, two of them quite severe, so that "he got quite faint." About the end of the year the eyes became prominent. About six weeks before admission swellings appeared in both temporal regions. These were ascribed to injuries, though there was no history of such. For some time the heart's action had been accelerated, and a month before admission exophthalmic goitre was diagnosed. For two weeks before admission the boy had been deaf, and for ten days dizzy.

Status, on admission, March 16, 1892: Undeveloped boy of slight frame; poorly nourished muscles; moderate panniculus. Skin very pale; waxy; no cyanosis; slight œdema on temples, none on the extremities;



a few ecchymoses on thighs, legs, and prepuce, from one to five millimetres in diameter. Infantile sexual organs; no pubic hair. Expression anxious; scleræ bluish, visible mucous membranes very pale. On the teeth, small brownish patches and traces of fresh blood. Small ecchymoses on hard palate and velum; gums very pale, not swollen. Pinching the skin causes bluish-red discoloration, becoming dark yellow by next day. The eyes are prominent; the lids cannot be entirely closed. Above the bulbs one can feel hard masses through the upper lids. These extend from the inner to the outer canthus, are from one-fourth to one-half inch wide, project slightly in advance of the superciliary ridge, with which they form sharp angles. They are immovable, closely fitting the bulbs below, and above giving the impression of growing out from the orbital connective tissue rather than the orbital bones. They have smooth surfaces; the lids over them are dark, freely movable. The eyes project about one-quarter inch beyond the superciliary-malar line. Left pupil smaller than right; reflexes normal on both sides. Ophthalmoscopic examination (Dr. Carrow) shows hemorrhages in both retinæ—small, very numerous, accompanying the vessels; also white patches.

There are symmetrical swellings in both temporal regions, occupying all the space beneath the temporal fascia, and probably half an inch

thick at the thickest part, tapering off to the edges. Owing to œdema in the skin over these swellings it is difficult to examine them. They are smooth and feel as hard as bone. There are no other tumors on the head. The thyroid gland is slightly enlarged. (This must have been of recent occurrence, as the mother had not noticed it, though told to expect it.) There is a fine but distinct thrill, and a systolic murmur over the gland.

Thorax small, but symmetrical. Percussion: right, normal; left, dulness below sixth rib in axillary line, filling Traube's space, and continuous with splenic dulness. Area does not change according to position. Absent vocal fremitus and breath-sounds over it. Respiration 26, costo-abdominal.

Apex-beat in normal position; heart dulness not enlarged; sounds faint but clear; radial pulse 126, small and soft, but regular.

Liver dulness area not enlarged, palpation normal.

Spleen can be felt three fingers' breadth below ribs, moderately hard, not painful.

Percussion over sternum causes pain.

Examination of abdomen negative. For some time there has been nausea, at times vomiting, and a very capricious appetite. The boy has taken little food during the last few weeks.

Urine 1000 c.c.; sp. gr. 1017; acid; yellow. Copious sediment of urates and phosphates, with cylindroids and small hyaline casts. No albumin or sugar. Urea 1.7 per cent.

Blood. Fresh drop shows enormous increase of colorless corpuscles, apparently as numerous as red. Red somewhat diminished, but not otherwise altered. Thoma-Zeiss shows 3,150,000 red and 743,500 white corpuscles to the cubic millimetre; Fleischl, 60 per cent. Dried and stained with eosin and methylene blue, the blood shows great increase of lymphocytes, a few large mononuclear cells with faintly staining nuclei; relatively diminished polynuclear cells, no eosinophile cells; no myelocytes; a few normoblasts.¹

Three days after admission I made the patient the subject of a clinical lecture in the University Hospital. The diagnosis was leukæmia, based not only on the blood-finding, but also on the history and the other symptoms, viz., pallor, dyspnoea, hemorrhage, rapid heart, gastric disturbance, and eye (retinal) changes. I called attention to the fact that the enlargement of the spleen was hardly sufficient to explain the high degree of leukæmia, and as there was no enlargement of lymph glands I assumed the bone-marrow was extensively diseased. At the same time I pointed out that the blood examination, as far as it had gone, did not confirm this. The pain over the sternum I was not inclined to use as a diagnostic sign of lesion of the bone-marrow. An acute leucocytosis as the result of sarcoma I rejected on account of the long duration of symptoms of blood disease.²

¹ Having no preparations ready for the Ehrlich stains we had to forego their use at the time.

² My first diagnosis of the case, before taking the history or examining the blood, was sarcoma of orbit (Tenon's capsule) with metastatic growths in the temporal region.

Exophthalmic goitre as a diagnosis fell to the ground as the examination proceeded. The exophthalmus, the goitre, and the heart symptoms were all explicable on other grounds; there was no tremor, no discoloration nor vasomotor change in the skin, no Graefe's nor Stellwag's symptom.

The boy's condition became rapidly worse. The temperature rose to 102° F., pulse between 120 and 180. A trace of albumin appeared in the urine. The goitre and the œdema over temporals subsided, and on the sixth day after admission the patient died. He was able to take only the smallest quantity of food (milk and lime-water, a little rare beef) during the time he was in the hospital. He had a craving for beef.

An autopsy was obtained with great difficulty, and was not complete. For it, and for valuable assistance at it as well as for the photograph from which the illustration is taken, I am indebted to my friend and colleague, Dr. W. J. Herdman. The autopsy notes (condensed) are as follows:

Section—post-mortem. Cadaver of undeveloped and emaciated boy. Marked rigor mortis; very faint discoloration on back. Skin pale, eyelids dark; on thighs and skin of penis small ecchymoses. Moderate panniculus. The periosteum of sternum is thickened and of a pale-greenish color. Omentum well preserved. Mesenteric glands slightly larger and pinker than normal. Slight excess of fluid in peritoneal cavity. Thymus weighs ten grammes, larger part 4 x 5 cm. just above arch of aorta, continuous with a narrow process extending to the cricoid cartilage. Lower part appears normal, not degenerated; upper part is homogeneous and contains a small green tumor. Thyroid not enlarged.

Lungs collapsed; heart in normal position. Left pleura contains 800 c.c. of bloody fluid. Pericardium contains normal amount of fluid; its walls thickened, especially on the left side; of pinkish color, and showing numerous subserous hemorrhages. Heart weighs eight ounces. Over left auricle numerous pale green nodules from one to five millimetres in diameter. Both ventricles contain large, firm, greenish-yellow clots, which are continuous with similar ones in the auricles and pulmonary vessels. Numerous sub-endocardial ecchymoses in both ventricles, especially left. Left lung crepitant over anterior part of upper lobe only; the rest is tough and leathery. Over the posterior part of the lower lobe there is a deposit of greenish material under the pleura and stripping off with it from one to three millimetres thick. Right lung slightly adherent behind, crepitant all over; slight hypostatic congestion in lower lobe posteriorly. The pleura has a deposit of greenish-yellow material in it similar to that in left side.

Spleen slightly enlarged; weighs 150 grammes; capsule wrinkled, of a pale pink color, with greenish shimmer. Cut surface granular, very anæmic, Malpighian bodies indistinct; larger vessels have greenish walls. A small accessory spleen has the same characteristics.

Kidneys, small (4 and 4½ ounces), smooth, very pale; section anæmic, glistening, structure not plain; cortex rather wide; in the boundary zone are numerous small greenish bodies with indistinct outlines. In the pelves small greenish-yellow bodies similar to those on the heart.

Supra-renal bodies appear normal.

Pancreas looks normal, but contains near the tail a pale-greenish body the size of a small pea.

Stomach. Mucous membrane shows thickly-set ecchymoses, especially in lesser curvature, from the size of a pin-hole to that of a pin-head; scattered over the mucous membrane are small pale greenish-yellow prominences.

The solitary glands in upper part of ileum slightly enlarged, two Peyer's patches about three feet above valve show shaven-beard appearance. Mucous membrane of colon grayish, the solitary glands black; there are numerous ecchymoses in the mucosa, some in the cæcum being one to two centimetres in diameter.

Liver weighs 40 ounces; capsule smooth, rather cloudy. Under the capsule are a few small pale-yellowish areas. Section shows anæmic glistening surface; tissue soft; acini not distinct; the larger vessels have greenish walls. Cut surface shows a few small, indistinctly outlined, yellowish nodules.

Along the whole length of the vertebral column, from the neck to the pelvis, there is a green, smooth layer under the serous membrane. In the thorax the layer is more than one centimetre thick, and becomes thicker at the insertion of the diaphragm. The mass is continuous with the periosteum, in fact replaces it; the vessels and nerves pass through it. On section it is firm, smooth, in places showing bands of white fibrous tissue, vessels, and nerves. This mass extends on the ribs and intercostal muscles for some distance under the costal pleura. On the abdominal vertebræ it is thin, appearing only as a thickening of the periosteum.

Pericranium thickened and of bright green color. Under the temporal muscles are bright green masses, filling the space between the periosteum and the thinned temporal muscle. Section of the tumors shows homogenous structure, hard and moderately dry.

The dura is greenish, the bone not altered. The walls of all the venous sinuses are thickened and show a green color, like the other parts described, though not quite so bright. The sinuses contain pale-greenish clots.

The brain shows no change beyond extreme anæmia.

On removing the roof of the orbit, the cavity is found filled with a solid green mass, which separates easily from the bone in some places, leaving it smooth. On cutting through the tumor, the bulb is found loose in the front part, the vessels, nerves, and muscles running through the mass. Remains of the periosteum and connective tissue are seen only at the sphenoidal end of the orbit; most of the connective tissue and fat of the orbit is replaced by or converted into the greenish material.

The spinous processes and laminae of the vertebræ are covered with similar greenish material, the green color passing for some distance into the fibrous tissue running into the dorsal muscles. On opening the spinal canal the dura is found unaltered, but the periosteum is thick and greenish-gray. The most remarkable thing in this part is the transformation of the loose fat of the spinal canal, which is totally converted into soft, greenish masses, some of them several centimetres in length, and having only a loose connection with the dura. Many of these show small reddish areas on section. The cancellated part of the sternum in dif-

ferent places, of the ribs, vertebræ (bodies, spinous processes) and skull, was pale and dry-looking, but apparently healthy; pieces of each were removed for microscopic examination.

For sections, pieces from various organs were hardened in alcohol (95 per cent. and absolute), Fleming, platinum chloride, sublimate, and Mueller's solution. Parts prepared for showing the nuclear structure were hardened by Prof. W. H. Howell, but, owing probably to post-mortem changes, did not give good results. On the whole, pieces hardened in alcohol gave the best results. Sections were cut unimbedded, in celloidin and in paraffin, and stained with alum-carmine, hæmatoxylin and eosine, safranine and *licht-Grün* (Benda), and hæmatoxylin and orange G.¹

Unimbedded sections were also stained by Gram's method and with methylene blue with negative results so far as bacteria are concerned. Sections were also cut from some of the tissues in Mueller's fluid, the day after the autopsy, on the freezing microtome, and examined in the fluid.

The growth shows the same general characteristics in all parts of the body. It is made up of round or roundish cells, somewhat larger than those of a lymph nodule, which they resemble. They lie in a vascularized reticulum. The reticulum varies in character in different parts of the body, and even in different parts of the same section. In some places it is very fine and in fine meshes, in others the fibres are coarse and the meshes larger. The coarser fibres are evidently fibres of the original connective tissue of the part, as their relations show.

The reticulum showed best in fresh frozen sections with the cells shaken out, and closely resembled that of a lymph gland. Unfortunately, these were not kept, and the drawing made by Dr. Huber, from a hardened section, which was very difficult to pencil, gives a less satisfactory picture than the fresh material. (See Plate: figure A.)

The amount of fibrous tissue varies according to the seat of the growth. Along the vertebræ it is quite extensive, while in the spinal canal there is an extremely fine reticulum with no fibrous septa or bands.

Connective tissue in all places shows a predilection for the new growth.

In the green masses the nerve-sheaths and the adventitia of veins are entirely replaced by lymphoid tissue. The adventitia of arteries is involved, though less completely.

The vascular supply of the growths is usually extensive, and consists of vessels of old and new formation. The arteries seem to be those of the original tissue, but the accompanying veins are often so involved in the growth, and their lumen so altered by growths in their walls, that it is difficult to recognize them. There are, besides many vessels having only an endothelial lining and a thin fibrous, or probably, in some cases, muscular wall, the latter closely surrounded by the new growth. Lymphatic vessels are numerous and in many places show dilatations, or open out of cystic cavities filled with colorless corpuscles, and some-

¹ Paraffin sections were stained by Dr. G. C. Huber, assistant professor of histology, by the two latter-named methods, but no mitoses could be found. Dr. Howell intended to study the pieces from the point of view of blood formation. As this was prevented by his change of location, Dr. Huber kindly took up that part of the subject, but with negative results, though he devoted an amount of time and care to the matter that can only be appreciated by those who have done similar work.

times containing a small proportion of red blood cells. Some of the cavities are as much as two to three millimetres in diameter, lined by endothelial cells and filled with cells like the others described.

The cells, as mentioned above, are round, or sometimes longish, but never spindle-shaped. They have a small amount of protoplasm—in places almost none; in others, especially in the denser connective tissue, the nucleus occupies about two-thirds the diameter, with finely granular protoplasm around it. The cells in the growth do not differ in their appearance from those in the bloodvessels. They show no evidence of degeneration. Spindle cells are found only along the vessels. "Mastzellen" appear in excessive numbers in various organs in or near the new growths.

The topographical and other peculiarities of the growths not yet described can best be studied in connection with the different tissues examined.

In the orbit the growth extends from the bony walls to the bulb and eyelids, and involves all structures but the optic nerve and bulb. The periosteum shows, to the naked eye, only in the posterior part, but microscopically it can be seen that the inner (bone) layer is not at all infiltrated. In some places the bone separates easily, in others it is closely adherent (decalcified sections). A few fat cells are left in the mass, but almost all the fat and connective tissue is replaced by lymphoid tissue. The nerves lie in masses of the tumor without any trace of their sheaths. The adventitiæ of the smaller arteries and of the veins have disappeared. The sheaths of the muscles in many places are replaced by the new growth, and in many places there is round-celled infiltration between the bundles of muscle fibres. In many cases the intra-muscular septa are infiltrated, while the sheath at the same level is not involved.

The growths in the dura and sinus longitudinalis are also developed from the external layer of the membrane (as is the case in all parts). The microscopic appearance of the dural tumors is rather different from that found in other parts, in the greater amount of connective tissue. This is so arranged as to give a slightly fasciculated appearance. In many places there are long narrow spaces between lines of hard fibrous tissue, filled with round cells, and causing an appearance similar to that in inflammations in fibrous tissue, or in the infiltration around a carcinoma or the wall of an old cavity. The vascular supply of the tumors in the dura is very much less than in other situations.

The thick masses along the bodies of the vertebræ resemble those of the dura in the frequent appearance of a fasciculated arrangement. In the middle of the mass this resembles carcinomatous structure, though the cells are of the same lymphoid form as in other places. The alveolar-looking part is inconsiderable, and around it the tissue has a lymphoid appearance, varied according to the bands of original connective tissue, vessels, and nerves running through it. Nerve-sheaths and adventitiæ are entirely replaced by lymphoid tissue. In many places the walls of the veins are filled with round cells, so that the lumen appears only as a narrow Y-shaped slit. Channels and irregular cavities lined by endothelial cells and containing cells like those of the new growths are numerous. In the loose connective tissue between the dense mass and the pleura there are scattered groups of cells, less numerous and smaller near the pleura.

The pleura is extensively involved, so that it is difficult to find places

where there is no round-celled infiltration. In some parts this causes thickenings visible to the naked eye. These have the same structure as in other parts. Often there is an abrupt boundary between lung and new growth, but in other places the lymphoid tissue passes into the lung, replacing it more or less completely. The borders of the infiltration are not well defined, the septa being thickened for some distance around the denser infiltrate by numerous round cells. In some parts, in the vicinity of the new growths, there are catarrhal, œdematous, and hemorrhagic areas.

The growth in the temporal region shows very interesting relations. It is confined between the deep layer of the pericranial and the temporal fascia and muscle. Beginning at the upper border as a narrow layer between the two membranes, it becomes thicker toward the middle of the muscle, where it reaches a thickness, in the hardened specimen, of 1 cm. Nearer the inner surface the growth is without trace of muscle fibres. Farther away from the bone isolated fibres are encountered, very narrow, but still showing transverse striæ, and nuclei which stain well. These are separated by lymphoid tissue, but still farther away the fibres are closer together. Finally, just under the temporal fascia, is a layer of muscle fibres 1 mm. thick, with very little infiltration, but with an excessive amount of connective tissue, as if many fibres had disappeared. The new growth has a fine reticulum. Spindle cells are rare. The vessels exhibit the same characteristics as described in other parts.

On the spinous processes the periosteum shows no infiltration close to the bone. The fibrous origins of the dorsal muscles are densely packed with lymphoid cells, sometimes extending far out between the muscles (at least 1 cm. from the bone). The walls of the vessels are infiltrated in many places.

The lymphatic glands examined were those from the mesentery, the only ones which showed enlargement. These show marked hyperplasia. The medullary sinuses are not to be recognized as such, being uniformly filled with cells like those in the nodules, but not quite so closely packed. The fibrous septa and reticulum are not hypertrophied.

The spleen shows areas of lymphoid hyperplasia which pass gradually into tissue that is almost normal. The hyperplastic areas are sometimes as much as 5 mm. in diameter. These, like the similar change in the lymph glands, cannot be distinguished from those in sections of the same organs from cases of leukæmia.

The larger mass of the thymus shows only a slight infiltration of lymphoid cells in the septa and an increase of cells in the central parts of the nodules. The long narrow process extending up to the cricoid is made up of a narrow strip of almost normal tissue, passing abruptly into lymphoid material which shows no trace of the original relations. The extremity of the process, which contained a small greenish tumor, has a very thin capsule but no septa. The peripheral part is made up of lymphoid tissue of uniform structure. The tumor can be recognized by its closely packed cells, which lie in a fine reticulum. This central part lies loosely in an irregular cavity, the borders of which are formed by lobular masses the size and shape of thymus nodules. In some places the two parts have no connection, but in others the tumor passes into the adjacent structure. In the central part, and in the extreme periphery of the gland, the cells are round, but in a narrow zone at the

edge of the cavity described, the cells are long and lie in long, narrow spaces between fine lines of fibrous tissue. There are a few Hassall's bodies in the peripheral part. In other words, all the fibrous tissue of this part of the thymus has undergone lymphoid change. In all parts dilated lymph channels and cystic spaces filled with lymphoid cells occur.

Numerous sections of the bone-marrow were stained and examined by Dr. Huber with negative results. In some places there seems to be an increase of lymphoid cells, but after careful examination I think Dr. Huber's idea that these are in the vessels is correct.

The liver shows a scanty infiltration of lymphoid cells in various parts, without definite relation to the zones of the acini. In some places the cells are more closely aggregated around the central vein, in others in the portal areas, especially in the connective tissue and the walls of the portal vein. In some places small lymphomatous areas occur. These are not sharply circumscribed. At their margins the capillaries are dilated and filled with (leukæmic) blood. Farther in, no liver cells are to be seen, the original tissue being replaced by the lymphoid growth.

In the kidneys the epithelial cells, including nuclei, are well preserved. In the boundary zone or the pyramid near it are a few lymphoid areas, not more than 3 mm. in diameter. The smaller ones are mere diffuse infiltrations. The larger ones show masses of lymphoid tissue between the tubules. The parts of the tubules between the new tissue appear normal, but at the sides the tubules are compressed and their cells atrophied. In the cells of the branches (especially ascending) of Henle's loops, also perhaps in the collecting-tubes, in the pyramids, are fine greenish-yellow, glistening granules, sometimes scattered, sometimes in small masses. Rarely, yellow granules are seen in the inter-tubular tissue. The yellow pigment occurs in only in a few places, and apparently has no relation with the infiltrations. The parts sectioned show no hemorrhages.

The supra-renal bodies are normal. In the fat around them the walls of the vessels show round-celled infiltration. In the stomach there is an unusual quantity of lymphoid tissue at the base of the tubules. In many places the intertubular tissue contains an excess of small cells, and in some places, just beneath the surface, these cells form large masses extending over areas of several millimetres.

The most obvious features of the case are those relating to the tumor-formation, and they relegate it at once to the category of chloroma as described by systematic writers. (See the works of Birch-Hirschfeld, Ziegler, and Klebs.)

The first mention I can find of a case of this kind is by Allan Burns (*Observations on the Surgical Anatomy of the Head and Neck*. By Allan Burns. 1st Am. ed., Baltimore, 1823, p. 386). The history of the case is not given in full.

The patient was a young man who had a tumor in the left orbit, with protrusion of the eye, followed by loss of vision and destruction of the eye. Later a similar growth appeared in the right orbit. The patient had paralysis of the lower extremities and bladder and died about three months after the beginning of the disease.

After death, tumors were found in the orbits which were supposed to have grown from the lachrymal glands. At all events those glands were diseased. There were tumors on the frontal bone, in the frontal, ethmoidal, and sphenoidal sinuses, the nose and the dura mater, with thickening of the periosteum and dura, caused by deposits of a peculiar greenish-yellow substance having a cartilaginous hardness and containing more or less fibrous tissue.

Burns thought the disease one *sui generis*. "The series of parts affected and the mode of propagation were different from what is generally met with in fungus hematodes or medullary sarcoma."

The next case was reported by Balfour (*Edin. Med. and Surg. Journ.*, 1835, xliii. p. 319), of Edinburgh, in 1834, as one of peculiar disease of the skull and dura mater.

In 1836, Durand-Fardel (*Journ. hebd. des Prog. des Sci. Méd.*, Paris, 1836, t. iii. p. 207) reported a case. He cited the case of Balfour, the only similar one known to him, but said there was a third observation of the same kind in the *Revue d'Edimbourg*. It was impossible for him, as it has been for me, to find an account of it.

Dittrich, of Prague (*Prag. Vierteljahrsschrift f. die prakt. Heilk.*, 1846, Bd. ii. p. 104), in 1846, at the autopsy of a woman who died with symptoms of scorbutus, found "dirty green" tumors on the periosteum of the vertebræ, ribs, and cranium, and also in the kidneys and ovaries.

In 1853, King (*Monthly Journ. of Med. Sci.*, Edin., August, 1853, vol. xvii. p. 97), of Glasgow, under the title of "A Case of Chloroma," reported the details of a case seen in 1849, having symptoms much like those in my own, but with the tumors limited to the head. Models and preparations of this case were placed in the Museum of Anatomy in the University of Glasgow.

In 1854, Aran (*Arch. gén. de Méd.*, 5. sér., 1854, t. iv. p. 385) reported a case seen in 1851, and made it, with the cases of Balfour, Durand-Fardel and King, the subject of an anatomical and clinical study. The same case was published by Lebert, who made the microscopic examination, in his *Traité d'Anatomie Pathologique* (Paris, 1857, i. 323, plate xlv., figs. 1 to 4), with illustrations of the growths. These two articles served to call attention to the subject and form the first landmark in its literature. It seems proper here to correct a wrong impression concerning the name chloroma. Most of the German writers, following Huber, speak of Aran as the author of the name. But King's article, with the word in the title, appeared fourteen months before that of Aran. The latter distinctly says (*loc. cit.*, p. 386): "M. King, a publié dans un journal Anglais, en lui donnant le nom de chloroma," etc. Aran gave "cancer-vert" as the synonym for chloroma. It is not a little curious that King does not use the name in the

body of his paper, so seeming to indicate that it was already in use, but I can find no previous application of the term.

Mackenzie (*A Practical Treatise on the Diseases of the Eye*, by Wm. Mackenzie, M.D., Philadelphia, 1855) at least as early as 1855 had a section on chloroma in his chapter on the Diseases of the Lachrymal Glands, and cited a characteristic case seen by himself in the Glasgow Eye Infirmary in 1830-'31. Mackenzie spoke of a similar case reported by Williams (*Med. Gaz.*, London, 1849, xliv. p. 854. See also *Path. Trans.*, ii.). A careful study of the latter makes it certain it was not one of chloroma, and the same remark is true of the cases of Sir E. Home, referred to in another place (*loc. cit.*, p. 970) by Mackenzie.

In 1855, Hillier (*Trans. Path. Soc. of London*, 1855, vii. p. 337) reported a case to the London Pathological Society. This is spoken of as a case of recurrent tumor of the orbit, and its resemblance to the chloroma of Mackenzie mentioned.

In 1866, Dressler (*Arch. f. path. Anat.*, etc., 1866, Bd. xxxv. p. 605) described a case of the same kind in a letter to Virchow. The case occurred in 1860, in Prague. Dressler was not aware of the case of Dittrich.

No other example was seen, apparently, after that until 1878, when the occurrence of an example in Thiersch's clinic gave the late Carl Huber an opportunity for a thorough anatomical and clinical study of all the cases known to him. (*Arch. der Heilkunde*, 1878, xix. p. 129.)

Since then instances have been more frequently observed. In 1882, Behring and Wicherkiewicz (*Berlin. klin. Wochenschrift*, 1882, No. 33, p. 509) reported one from Posen; Waldstein (*Arch. f. path. Anat.*, Bd. xci. p. 12) one from Heidelberg in 1883 (in this case leukæmia appeared late in the disease). In the same year Chiari (*Prag. Zeitschr. f. Heilk.*, 1883, Bd. iv. p. 177) reported a third case in Prague. In 1884, Gade (*Nord. Med. Arkiv*, Bd. xvi. No. 19, and *Comptes-rendus*, xvi., No. 22, p. 20) reported a new case with an analysis of the cases known to him, ten in number. The year after, Von Recklinghausen (*loc. cit.*) mentioned he had seen a case, and raised the question of the leukæmic nature of chloroma. Finally, Höring (*Arbeiten aus d. Path. Anat. Inst. zu Tübingen*, Bd. i. Heft 1, p. 180), in 1891, reported a case from the Tübingen clinic.

My own case raises the total to seventeen, those of Burns, Mackenzie, and Hillier having been overlooked before. There are, perhaps, cases recorded not published. Hamilton in his *Text book*, says (i. p. 506): "The author has several times met with a peculiar soft, light green-colored tumor, situated in the anterior mediastinum, usually attached to the posterior aspect of the sternum. It had all the appearance [microscopic?—D.] of a round-cell sarcoma, but had a quite remarkable

green color (chloroma).” Unfortunately no other particulars are given (I shall mention later cases that are either the same as or closely related to chloroma).

In all the cases the most obvious point in common is the peculiar color, which suggested the name chloroma or cancer-vert. The precise tint was probably not the same, making due allowance for difference in nomenclature. Thus, Burns makes it “greenish-yellow;” Balfour, “bright olive green;” Durand-Fardel, “vert pomme très foncée;” Dittrich, “dirty-greenish;” King, “yellowish-green” (his plate shows a dark green); Aran, “gris-verdâtre” or “gris-vert;” Mackenzie, “light greenish or whey color;” Hillier, “yellowish green;” Dressler, “light green;” Huber, “dark yellowish-green;” or, in fresh (operation) specimens, “exquisite light yellowish-green;” Behring and Wicherkiewicz, “beautiful dark grass-green;” Waldstein, “pea-green or darker;” Chiari, “light green;” Gade, “vert-jaunâtre to vert-grisâtre;” Höring, “yellow or greenish-yellow,” or “ziemlich reines grün.” In my own case the color could be best described as pea-green. It was much like the tint shown in the plates of Chiari and Dressler; not so dark as King’s or Lebert’s. It differed, however, in various parts, so that some were pale sage-green, others darker, or again with pink, brown, or red stains. The small growths in the liver and kidneys were almost white, but in the pancreas and thymus the color was distinctly green, though pale. The color gradually faded from the preserved specimens. Owing to the fact that the solutions were frequently changed, it is impossible to tell whether the color was dissolved out or bleached.

The cause of the color still remains unknown. Balfour, without making any examinations, supposed it to be due to some pigment allied to bile coloring matter. Dittrich attributed it to putrefaction, which was plausible, though in my case, as well as in some others, as also in the parts removed during life in Huber’s case, such an explanation is impossible. King had part of the tumor and the spirit in which the specimens were kept examined by Dr. R. D. Thompson, who reported that “he could find no trace of bile, the only source from which green coloring matter could emanate in the human system so far as we know at present.” He quoted the opinion of Lebert, that a greenish color could arise from a local infiltration of a peculiar kind of fat. (Lebert, *Physiol. Pathologique*, ii. p. 122). King also speculated as to the possibility of the color being due to the altered extravasated blood, but noted that old and recent tumors had the same shade of green. Aran and Lebert did not venture to explain the nature of the coloring matter. Virchow, in his comments on Dressler’s case, said the color was diffused in the tissue without granular or crystalline deposits. This was in tissue which had been dried, so that the conditions were different from those

in other cases. Huber was the first to make careful investigations into the nature of the color. Without describing his methods in detail, suffice it to say that he ascribed the color to certain fine molecules found in the cells, which he thought were allied to, if not really fat. This opinion was shared by Chiari on account of the reaction of the granules seen by him to alcohol and ether and to osmic acid. Chiari says, and the explanation is plausible, that in Huber's case the granules were so small as to be recognized with difficulty. In his own this was not so, and the recognition of the fatty nature of the granules was easy. Chemical examinations by Huppert proved the coloring matter to be one hitherto unknown in the human organism. Höring came to conclusions identical with those of Chiari. Behring and Wicherkiewicz claimed to find in the tumors in their case an unusual proportion of chlorine. They were led to make the analysis from having found that tough sputum containing many desquamated cells and inspissated pus when treated with chlorine became grass-green.

Waldstein thought the coloring matter a derivative of blood. From Langhans's experiments (*Arch. f. path. Anat.*, Bd. xlix. p. 102 *et seq.*) it might be supposed that the color was due to altered extravasated blood. The following facts oppose this: The green color under the microscope is not so distinct as Langhans described it; it occurs often when there is no other sign of old extravasation; in parts (spinal fat, intestines) with numerous extravasations there is neither more nor less color than in other places, except red stains from orange-red granules, which occur in the altered spinal fat. Examinations by Otto in Gade's case showed an absence of both bile and blood-coloring matter, so that Gade shared the opinion of Chiari and Huber, that the color was dependent on fatty granules. Opposed to this view, and impossible to reconcile at present, are the negative results Von Recklinghausen had by the use of osmic acid. The latter held that the color was a parenchymatous one. He compared it, as did Huber and Dressler, with that of old pus, making this one of his reasons for believing the color parenchymatous (as Virchow had done).

Not knowing at the time the difference of opinion, I lost an opportunity for having examinations made by an expert. The idea I had from the literature, that the pigment was of a fatty nature, seemed confirmed by the abundant, highly refracting granules which were certainly present in the cells in the fresh frozen sections. In sections examined later, after the tissue was decolorized, the granules were absent. I also thought that the peculiar color was simply an exaggeration of the greenish tint so common in the blood-clots and the neoplasms of leukæmia. The finding of greenish-yellow pigment in the renal epithelium in Chiari's case and my own seems to me to oppose the idea that these were fatty, since in my own case, though the green tumors have long been bleached, sections

of the kidney from specimens more than a year in absolute alcohol show as much pigment as ever. The pigment must be altered in some way in the kidneys, if it be really the same as that which gave color to the fresh specimens. Our knowledge of such pigments is so imperfect that the whole subject must be left to future investigations.

In other physical characteristics, the chloromatous tumors exhibit points of resemblance. The consistency varies from a gelatinous or soft elastic (Aran) to a firm cartilaginous (Balfour, Burns). Most frequently it is described as moderately firm or brawny (Dittrich, Höring, Huber).

In my own case, I could find all the different degrees of hardness, from a soft elastic in the orbit, or very soft and gelatinous in the spinal canal, to dense cartilaginous hardness along the vertebræ.

The cut surface is described by various writers as homogeneous, with or without fibrous septa, depending on the seat; and this, too, was to be seen in my case.

In some cases, a turbid greenish juice could be produced by scraping the cut surface (Aran); in others the juice was scanty and colorless (Huber), or thick and creamy (Dittrich), or the tissue was almost dry (Höring). These characteristics, as also the presence of a moist lustre (Behring and Wicherkiewicz, Huber), depend on the seat of the growth and the firmness and vascularity of the tissue in which it develops. In my case the tissue in the orbit, more so than in the spinal canal, was moist and yielded much juice, that along the vertebræ and on the pleura was almost dry.

The external surfaces of the tumors were smooth or nodular—tumors proper, as distinguished from uniform infiltrations, being usually nodular.

In regard to the seat of the growths, we find most interesting data. In all the cases reported some part of the head was affected. In twelve cases the scalp contained greenish deposits; in fifteen the dura, in thirteen the orbit, in eleven, various parts of the periosteum of the face. Less frequently we find the green substance in the periosteum of the vertebræ and the ribs adjacent (five cases); under the temporal muscle (five); bone-marrow (four); liver (four); kidneys (eight); spleen (three); mesenteric glands, stomach, intestines, pleura, lungs, heart and pericardium, mediastinum, submaxillary and cervical lymph glands, nares, pharynx, testes, ovaries, prostate, lingual tonsil, bronchial lymph glands, pancreas, thymus, pelvic connective tissue, broad ligament, skin, mammary gland, internal and external ears, in eye at insertion of optic nerve. (In several cases the examinations were not complete.)

The marked predilection of the periosteum, especially that of the head, has been noticed by all observers, and most of them look on some part of the periosteum of the head or face as the starting-point. So Huber, in whose case tumors were first noticed in the mammary gland, believed the primary disease was in the head. It does not seem possible, either from

the histories or post-mortem records, to show a common point of origin, as in the orbit. Burns thought the disease primary in the lachrymal gland. Mackenzie examined King's specimens, and concluded, as did King, that the disease began in the periosteum of the lachrymal fossa, affecting the gland secondarily.

The predilection is not for periosteum alone, but for fibrous tissue in general, as strikingly exhibited in my own case.

In regard to the histological structure of the growths, we must bear in mind the fact that we cannot accept without criticism the names given by writers of more than a generation ago, for we know, from what has been said, that the growths belong to a class which has been the subject of endless controversy and change of name. Interesting as it would be to quote the histological descriptions of different writers on the subject, the recital would carry this paper to an inordinate length, and the necessity is less urgent from the fact that the recent literature is easily accessible.

The new growths are sarcomatous, in the sense that they are "connective tissue formations, with excessive development of the cellular elements." (Virchow, *Path. Geschwülste*, ii. p. 177.) Taking the most obvious view, that they are periosteal sarcomata (metastatic periosteal sarcoma, Huber), we find certain points of difference from the usual conditions in such tumors.

There is an absence of bone formation. It is true, some of the older writers (King, Aran) mention spicules of bone in the tumors. But these were found only when the bone was usured, and the process was probably more like that which occurs in many diseases affecting the nutrition of the bone than that which takes place in myelogenic sarcoma.

There is an absence of polynuclear giant cells, so common in periosteal sarcoma. The cells found in different cases agree closely in size, shape, and appearance.¹

The difference between the myelogenic form of periosteal sarcoma and chloroma can best be explained by the fact that the latter develops from the outer layer of the membrane. Lücke² has, indeed, figured a periosteal sarcoma having a lymphoid structure, but it is not identical with the growths we are considering.

Again, chloroma differs from other forms of periosteal sarcoma in the absence of a tendency to form fibro-sarcomatous structure. The

¹ Although a minor point, it seems necessary to speak of an apparent contradiction to the above statement. Virchow (*Path. Geschw.*, ii. p. 220) says that Lebert (*loc. cit.*) "pictured large polynuclear cells ('grosse vielkernige zellen,')" etc. Lebert certainly has a figure (4) which looks something like a giant cell. In the text, however, he says the cells measured from 10 to 20 mm. in diameter, and nowhere mentions polynuclear giant cells. The figure, therefore, represents a number of cells.

² *Die Lehre von den Geschwülsten*, etc. Pitha-Billroth's Handbuch, p. 196.

only descriptions that seem to contradict this statement come from the earlier days of less exact technique. In scrapings the spindle cells and original fibrous tissue would be more striking than in sections. The fibrous tissue in all cases carefully examined was that of the original tissue.

In view, however, of certain clinical features observed in cases of chloroma, but even more so on account of the tendency of pathological knowledge, we must go beyond the diagnosis of sarcoma, since this has long been a collective name, including neoplasms of the most diverse kinds. We must make an attempt at a more distinctive histological classification, and must endeavor to learn something of the nosological and etiological relations of the growth. The latter is of the greatest importance, for we know that on the ground of causation we have separated a number of diseases from the category of sarcoma.

As regards the first point, my studies lead me to coincide with Von Recklinghausen¹ as to the lymphomatous structure of the growths. Höring, Chiari, and Behring, and Wicherkiewicz, all describe the tumors as lymphomatous in structure. Huber, too, described the tumors in his case as made up of cells lying in a network similar to that of the lymph glands, but not so regular and delicate.

Waldstein, who was led by the clinical features of his case to look at it from a new standpoint, called the growth chlorolymphoma, and declined to consider it a sarcoma. In some respects Waldstein went too far. Thus, he rejected the idea of sarcoma especially on account of the structure of the tissue, and the fact that nowhere else in the body could secondary tumors be found. So far as the statement regarding the structure is concerned, it is impossible to understand it literally. The assertion in regard to metastases seems strange in the light of Waldstein's description of greenish-colored lymph glands ("zwar nicht wesentlich vergrößert,") in the porta and behind the stomach, and a greenish discoloration of the dura and inner surface of the cranium, not to mention a walnut-sized green mass in the mediastinum. Waldstein, however, explained all this by saying the tumor was simply a hyperplastic lymph-gland, and the color due to numerous small and large hemorrhages. He thought the discoloration of the dura and the bone marrow could be explained by the fact that during life the urine was green-colored, though why the discolorations were so localized he did not explain. The peculiar fact about the urine is interesting in connection with the finding, in Chiari's case and my own, of a peculiar pigment in

¹ Von Recklinghausen said (*loc. cit.*): "More important than the green color is the pure lymphomatous structure, which appears in all the cases reported. Besides this is the multiple appearance of the growths noted in all except the imperfectly reported cases, and the distribution over the larger part of the tissue which stands in most intimate relation to the lymph system."

the kidneys. In my case the urine did not have a greenish tint, nor did it show any peculiar color reactions.

Höring has criticised Von Recklinghausen for saying that the lymphomatous character of the tumors was made out in all cases of chloroma, and says this cannot be accepted in the face of the belief of Virchow, Huber, and Chiari that the tissue was sarcomatous. If that were good reasoning we should have to call Aran's tumors "cancer," Hillier's "fibro-cellular," etc. It is most unfortunate that Virchow could examine the specimens only after they had been dried for years. Almost three years elapsed between the time when Virchow referred to Lebert's case and that of his examination of Dressler's specimens, and from the remarks appended to Dressler's letter it does not appear that Virchow recalled the "famous case" of Aran (*Path. Geschw.*, ii. p. 220).

Not only from later authors do we find various reasons for assuming the lymphomatous character of chloroma, but, as far as we could expect, from earlier ones also. King, for example, says the tumors showed a mass of irregular granules, some of a round, others of an oblong shape, mingled with imperfect fibres or fine filaments.¹

Aran's and Lebert's descriptions prove that their growth had a structure identical with the others.

Hillier described the tumor as a combination of the fibro-cellular and fibro-plastic. In other early cases, although we have no microscopic examinations to depend on, the other features of the tumors agree so closely that we have every right to view the growths as Von Recklinghausen did.

The idea that other forms of tumor may have the characteristic color of chloroma cannot be said to be groundless, but so far we can say that all the cases described as chloromatous agreed histologically. The remarkable case of Bock (*Arch. f. path. Anat.*, Bd. xci. p. 442) forms, I believe, a unique exception to the above statement. In that case the green color was due to biliverdin. The growth was adenomatous, though Bock called it sarcomatous simply because it was anomalous. The case evidently has little right to the term "chlorom," given in the "register" of the journal in which it was published.

The tumors can best be described, I think, as lymphomata, in the original sense (Virchow, *Path. Geschw.*, ii. p. 563). This seems less likely to lead to misunderstanding than terms like lympho-sarcoma or lymph-adenoma.

The lymphoid structure of the tumors is the principal thing in making the distinction, for although the similarity of lymphoma and lympho-sarcoma, histologically, is increased by the finding (Arnold, *Arch. f.*

¹ A criticism of King's description by Huber is based on a misconception of the word "areolar" in the then commonly used sense of connective tissue. Huber supposed it to indicate an alveolar arrangement ("areolares Gefüge").

path. Anat., Bd. xcviii. p. 506; Ribbert, *Ib.*, Bd. cii. p. 452; Klebs, *Allg. Path.*, ii. p. 673) of giant cells in simple hyperplastic lymph glands and lymphomata, their absence, as in chloroma, I look on as a point to be observed in the differentiation. This, of course, may not be a constant feature of chloroma, but, like all other distinguishing points between the two forms in question, becomes of use in cases lying at the extremes.

But for the present I think we cannot do better than continue to use the term "chloroma," and some synonym, as lymphoma, lymph-adenoma, lympho-sarcoma, or myeloma, could be used to express peculiar features or the views of the reporter.

In endeavoring to classify a tumor of this kind we have a striking evidence that the histological structure is not enough. It would be a waste of time to bring up other examples to illustrate this statement. What is necessary to complete our knowledge is the establishment of the etiological relationship of the growth. So far, attempts to solve this have been fruitless. In the meantime we can perhaps increase the chances of improving our outlook by examining the clinical characteristics of the cases.

The analysis of the cases I have gathered agrees in the main with those of Huber and Gade; but on account of the larger number of cases, as well as some features I wish to emphasize, I give my results.

Chloroma is most frequent in early life—the average age of fifteen cases being 15.26 years. Another is described as a young man (Burns); Von Recklinghausen does not give the age in his case. The youngest was four years old (Dressler); and seven were under eight. But that the disease is not limited to the very young, follows from the fact that five were over twenty, one twenty-eight, and one forty-four years (Waldstein).

In six cases females were affected; males in ten.

The course of the disease is short. The average duration in twelve cases in which it is given is five months. In one (Balfour) the patient is said to have been sick for two or three years, but active symptoms were observed only during a few months. But although in many cases the course of the disease was brief, in that of Durand-Fardel the patient was sick two years, having very abundant hemorrhages for eighteen months. In my own case I have used three months in making the table, but here, as in Balfour's case, the course must have been longer.

Exciting causes are rarely given. In Chiari's case the disease began with toothache, and the tumor first appeared in the site of the extracted tooth.

The fact that three cases were observed in Prague, three in Glasgow, and two in Paris seems worth noting.

The family and previous histories were usually good. Balfour noted, however, a phthisical family history; Hillier's patient was delicate, and

Durand-Fardel's was of lymphatic temperament, and sick four years with frequent catarrhs and hemoptysis.

Early symptoms were as follows: Pallor, 6 cases; emaciation, 3; nose-bleed, 3; "scorbutus," 1; petechiæ, 1; loss of energy, 2; fever, 1; frequent pulse, 3; headache, 3; tinnitus aurium, 2; deafness, 7; double vision, 1; loss of vision, 2; exophthalmus, 6; facial paralysis, 2; feeling of oppression, 1; prominence of temples, tumor of mammary, feeling of constriction, toothache, each 1. (Many cases were treated in eye or surgical clinics, and only the special histories are available.)

Symptoms occurring later are: Thirst, fatigue, strabismus, double vision (in addition to those noted before), deafness, otorrhœa, pain in epigastrium, dyspnœa, abscesses, anemia, œdema, hemorrhages from lungs, intestines, in skin, and from the nose, obstruction of the nose, fever, frequent pulse, nephritis, irritability, coma, delirium, convulsions, wasting, constipation, vomiting, involuntary stools, diarrhœa, anorexia, pain in the region of the liver, craving for meat (King, Dock), disgust for meat (Aran), enlargement of spleen (two, probably four, cases), swelling of thyroid.

Death usually occurred from profound exhaustion, inability to take food, and often with some of the nervous symptoms mentioned above.

This brief synopsis shows the great resemblance, clinically, of chloroma and leukæmia and pseudo-leukæmia. It is not within the scope of the present paper to consider at length the relations of leukæmia and pseudo-leukæmia. A great deal of valuable work has been done on the subject in the past few years, with the result of showing that certain cases of so-called pseudo-leukæmia represent an early ("aleukæmic") stage of leukæmia. All of them await the discovery of the etiological factor to make their relations clear. (Without wishing to make invidious distinctions, I refer to papers of Dreschfeld, *British Medical Journal*, April 30, 1892, p. 893; *Deutsche med. Woch.*, 1891, No. 42, p. 1176; Westphal, A. D., *Arch. f. klin. Med.*, Bd. li., Heft 1; editorial, *Medical News*, Phila., February 18, 1893, p. 191.)

It is necessary, however, to consider certain features of the cases before claiming more than a resemblance between the diseases named. I refer to deafness, exophthalmus, and the condition of the blood, for the other symptoms are common to many processes, the differential diagnosis of which is quite unnecessary.

As explanations of the deafness noted so often, in the cases of Durand-Fardel, Aran, Behring and Wicherkiewicz, and Gade, greenish masses were found in various parts of the internal or middle ear, in several others in the external auditory canal. In other cases the ears were not examined.

Deafness has been noted in leukæmia, and although in some cases, as that of Pepper (*Medical and Surgical Reporter*, 1883, xlviii, February

24, p. 197) it might be ascribed to hemorrhage, on account of its temporary character or sudden onset, in others it was due to the presence of leukæmic tissue in the ear. Politzer appears to have been the first to bring forward anatomical evidence of the latter (Otol. Congress, Basel, 1884, *Comptes-rendus*, p. 139). Later (*Arch. für Ohrenheilk.* xxiii. p. 242), Gradenigo reported a case of sudden deafness in leukæmia, partly disappearing. Post-mortem, there was evidence of chronic inflammation and old hemorrhages, with leukæmic growths in the mucous membrane of the tympanum. Gradenigo explained Politzer's case in the same way, believing the chronic inflammation a predisposing cause for leukæmic growths in the ear, and contrasted the tendency to hemorrhage in the eye in leukæmia with that of chronic inflammation of the ear in the same disease.

Exophthalmus was present in thirteen of the seventeen cases of chloroma. It was double in eleven. This, of course, depends on the involvement of the orbital periosteum and Tenon's capsule, which are affected not quite so frequently as the dura (and not always in continuity). The exophthalmus is, therefore, caused in the same purely mechanical way as in other tumors of the orbit, some of which, especially glio- and round-celled sarcoma, are not infrequently bilateral.

Exophthalmus has been described in leukæmia, and this is especially interesting from the fact that lymphoid tissue has never been seen or described in the orbit in health.

Leber (*Arch. f. Ophthalmologie*, 24. Jahrg., 1878, Abth. 1, p. 195) reported the case of a man of forty-eight years, with a leukæmia in which the red and white corpuscles were in almost equal numbers. Most of the leucocytes were small ones. There were large tumors on the eyelids, not adherent to the skin, going back into the orbit and not adherent to its margin. Both eyes were prominent. Under the conjunctiva tumors could be seen, having a dirty brown to violet color, as had those under the lids. There were swellings under the temporal muscles, which could not be distinguished from bone by the touch. There was hemorrhagic retinitis. The urine contained albumin and granular casts. The skin was pale; there was emaciation.

A bit of tissue removed from under the conjunctiva was soft, somewhat gelatinous. Microscopically, it showed closely aggregated mono-nuclear round cells in a delicate, wide-meshed, fibrillary connective tissue, not very well vascularized. The lymph glands in the neck were enlarged; the manubrium somewhat thickened and painful. There was great weakness, pain in the head, at times convergent squint, and thirst. The tumors in the temporal region became larger; the liver reached to the umbilicus; the spleen was enlarged. Exophthalmus increased, the swelling over the sternum reached the size of a fist, and tumors appeared in the parotid and submaxillary region. The patient died fourteen months after the tumors appeared in the orbit and six months after the leukæmia was recognized. No autopsy was made.

The resemblance of the case to most of those of chloroma is remarkable. Leber thought the tumors in the temporal region were from the bone-marrow, as I did in my own case, though every surgeon knows how deceptive the hardness of a tumor often is.

Leber quoted the case of Chauvel (*Gaz. hebd.*, 1877, No. 23) which was similar to his own in many respects, but in which the blood was not examined, though leukæmia was suspected.

Osterwald (*Arch. f. Ophthalmologie*, Bd. xxii., Abth. 3, p. 203) reported a case from Leber's clinic which is even more important in connection with chloroma than the preceding. The patient was a boy of four years. In April, 1881, a slight paralysis of the face appeared, and then receded. Then exophthalmus developed, flat swellings appeared in the temporal regions, the skin became cachectic, and there was loss of appetite. By May 25th there was double exophthalmus, dilated veins, and submucous hemorrhages; the tumors in the temporal region measured four to five by three to four centimetres in extent.

Leukæmia being suspected by Leber, the blood was examined and red and white corpuscles found in the proportion of 3-4 : 1. There was emaciation, and anæmia of skin and mucous membranes; on the skin a few petechiæ (flea-bites?). The skin bled easily; the blood was unusually thin and watery. No glands enlarged, except those behind the angles of the jaw. The liver extended two cm. beyond the costal margin; the spleen could not be felt. There was no pain or tenderness over the sternum. Later there was œdema of the eyelids; epistaxis; fever; pulse frequent, later slow, small, soft, and thready; tonic flexor contractions, tremors, and death, after repeated nose-bleed, three months after the beginning.

At the autopsy, flat, yellowish, "almost pus-colored," and tolerably firm neoplasms were found on the cranium, along the sutures. On the frontal were softer and reddish tumors. There were tumors in the walls of the transverse and cavernous sinuses and on the dura, of yellowish green, "durchaus eiterähnlichen" color, but hard. There were also areas of atrophy of bone, with osteophytes. At the base of the brain, and in the convolutions of the Sylvian fissure and optic thalamus, were hemorrhages.

There were ecchymoses all over the surface of the heart, under the pleura, and in the lung. The spleen weighed 71 grammes; it was soft, of pale brown color. The liver weighed 760 grammes. There were petechiæ in the stomach; the epigastric lymphatic glands were large, partly of greenish-yellow purulent appearance. There was also slight swelling of the mesenteric glands. The axillary glands were enlarged. On the ribs and along the vertebrae were leukæmic growths. The marrow of the ribs and right femur were of a brownish-green color and soft consistence. The diagnosis was myelogenic leukæmia, with leukæmic neoplasms as the cause of the peculiar symptoms.

Leucocytes occurred especially in two forms: most of them were of $1\frac{1}{2}$ to $2\frac{1}{2}$ times the diameter of a red corpuscle; the others the size of, or smaller than, red corpuscles.

The growths in various parts showed a leukæmic or lymph-adenoid character. Fibrous tissue varied in amount in different parts. (Osterwald reported the case especially as an example of the bacterial origin of leukæmia, for which see the original article.)

Birk (*St. Petersburger med. Wochenschr.*, 1833, viii, p. 377-86; *Fortschr. der Med.*, 1884, p. 138) has also reported a case beginning with intermittent fever, weakness, headache, swelling of liver and spleen. The lymph glands became enlarged; there was pain over the sternum. Examination of the blood showed a ratio of 1 : 3. The colorless cells were smaller than the red corpuscles, with few exceptions.

Exophthalmus came on suddenly, in both eyes, with loss of sight. Both testes became swollen; double pleural effusion came on, and after the appearance of œdema of the lower extremities the patient died. After death uniform infiltrations were found in various parts of the body. The exophthalmus was due to the formation of "new-formed lymph glands in the posterior part of the orbit."

Arnold and Becker (*Archiv. f. Ophthalmologie*, Bd. xvii.) and Bernheimer (*Bericht üb. die Heidelb. Ophthal. Gesellsch.*, 1889, p. 199; *Centralbl. f. allg. Path.*

u. path. Anat., 1890, p. 211) have reported cases of localized lymph-adenoma of the orbit. In a case reported by Kelsch and Vaillard (*Annales de l'Inst. Pasteur*, iv. 276) diagnosed *intra vitam* as leukæmia, but probably not entitled to that name, lymphoid tumors formed under the eyelids. It might be supposed that the lymphoid tissue could take its origin from the so-called "trachom" glands of the eyelid, but at least in the cases of so-called leukæmia with orbital tumors such an origin seems out of the question. (In regard to orbital lymphoid tissue, see Zaluskowski, *Arch. f. mik. Anat.*, Bd. xxx. p. 316.)

The case of Osterwald, even to the color of the new growths, is so like those of chloroma that it might seem proper to include it among the latter. For obvious reasons I have not done so. In the cases of Birk and Leber there is strong reason to suspect chloroma, but in the absence of more exact knowledge it is just as useful to keep them among leukæmic cases, showing, as they do, the peculiar localization of the chloromatous tumors.

In all cases in which the general condition of the patient is described, anæmia was marked. In a number of cases conditions closely related are described. So, in King's case there were petechiæ in the very beginning, and even at that time a slight blow caused severe hemorrhage; ten days later a blow on the face caused extensive extravasation as low down as the clavicle. By the end of the fourth week it was noted that health had failed. There were hemorrhages under the conjunctivæ, the skin (in a previously healthy "country-looking" girl) clear and bloodless.

In Aran's case there was early epistaxis, which was abundant every day for two weeks. There were anæmic murmurs over the heart and in the neck, and remarkable general anæmia. Aran spoke of the disposition to hemorrhage in his analysis of cases.

In the case of Durand-Fardel there was nose-bleed for eighteen months before admission. The skin was puffy and waxy and very anæmic.

In Mackenzie's case there was nose-bleed twice.

Balfour noted a bloody effusion under the conjunctiva.

Dittrich, whose case is reported chiefly from the post-mortem point of view, speaks of symptoms of "scorbutus." The body was pale, with few post-mortem discolorations; the blood like meat-water.

In Huber's case the patient was pale and anæmic; the cadaver pale, with few post-mortem discolorations.

In Chiari's case there was hemorrhage in the retina (but also new growths in the bulbs).

In Waldstein's case there was great anæmia early, and leukæmia appeared shortly before death.

In my own case all the blood symptoms noted, except characteristic scorbutic signs, were present.

In addition to Waldstein's case and my own, in which the proportion

of red and white corpuseles were those found in leukæmia, Huber noted in his own case, post-mortem, that in the blood, "in addition to the usual elements, among which the leucocytes were decidedly increased ('entschieden etwas vermehrt'), there were bodies which in all respects corresponded to the cells found in the new growths."

In regard to nose-bleed, it might be supposed the bleeding was due to pressure on the veins, but no other evidence of congestion was present. A similar explanation might be advanced for the retinal hemorrhage, but here again other evidence of obstruction is absent. In Leber's case of leukæmia, as in my own of chloroma, there was no choke-disk.

We have found, then, that in chloroma we have new growths which are like those of leukæmia, and which occur in the organs affected by those in leukæmia, either primarily or secondarily. We find, also, a complexus of symptoms which agrees, not only in its broad and striking features but also in detail, with that of the other condition. Three out of the nine cases examined since leukæmia was known show an increase of the leucocytes, two of them an increase such as is seen usually only in leukæmia. In the other cases no blood examinations were made, and we know that it is quite possible for a leukæmic blood to present no appearance that would attract attention. That makes the resemblance of chloroma to leukæmia greater, but there are two things that prevent us from going farther and claiming identity. These are, the short time in which increase of leucocytes has been observed in chloroma, and the unsatisfactory status of the term leukæmia.

Whether the increase of colorless corpuscles came on late, or was present during a longer period in my own case and in Huber's, can never be known. In Waldstein's case it was very late.

In rapidity of course, in general, chloroma stands between ordinary cases of leukæmia and those described by Ebstein (*D. Arch. f. klin. Med.*, Bd. lxiv. p. 343) as cases of acute leukæmia, one of which was Waldstein's case of chloroma. (The view advanced in the article just cited, that there is an essential difference between acute and chronic leukæmia, still requires confirmation.)

Chloroma also has a shorter course than is the rule in pseudo-leukæmia, but in the latter, too, we find exceptions.

Here, again, the possibility of a transition like that which is seen sometimes when leukæmia develops in the course of pseudo-leukæmia must be borne in mind, being exemplified in chloroma in the case of Waldstein's.

The greatest obstacle in attempting to show the possible relations of chloroma and leukæmia depend on the facts that we have so little knowledge of the anatomical basis and the clinical limitations of the latter.

Virchow's prophetic "Ich vindicire für die farblosen Blutkörperchen eine Stelle in der Pathologie" ("Weisses Blut und Milz Tumor," 1. Art.,

Med. Zeitung, 1846, Aug.-Sept., Nos. 34-36, and *Abhandlungen zur Wiss. Med.*, 2. ed., 173) has been followed by countless researches in the physiology and pathology of those bodies, and yet in the almost half-century that has elapsed how much more do we know than is contained in the following (*ibid.*, p. 192)?—"Leukæmia is not merely a purely anatomical, but essentially also a pathological conception. Not merely is the simple fact of the increase of the colorless corpuscles expressed, but, at the same time, the deficiency of red corpuscles, or, as I have emphasized from the beginning, the altered tissue formation of the blood in its dependence on certain organs."

We have, to be sure, learned much regarding the clinical features of leukæmia, and have widened its pathological anatomy, but our knowledge of its essential nature is not far from that expressed in the statement that it is "an albinism of the blood." (Virchow, *loc. cit.*)

Up to a very recent time the increase of the leucocytes was almost all that was needed to make the diagnosis. That is, the original idea of Virchow, that the difference between leukæmia and other conditions with increase of leucocytes—termed by him leucocytosis—depended on the permanence of the former (Virchow, *Path. Geschw.*, ii. p. 566, and *Cell. Path.*, Am. ed., p. 205: "Leukæmia is thus a sort of permanent progressive leucocytosis," etc.). But as more was learned of the transitory leucocytes, it was found that their differentiation, early or late, was not always easy. The attempt was then made to fix an arbitrary line between leucocytosis and leukæmia, and the idea of Magnus Huss, proposed long before (*Arch. gén. de Méd.*, 1857, ii. p. 308), to make the diagnosis when the proportion of white to red rose to 1 : 20 or more, was so eagerly taken up by clinicians that it seems to have answered a universal demand, which indeed it did—the demand for diagnostic signs. But like so many of them, it was found unavailable either to make a diagnosis or to confirm one when most needed. (Huss himself said the sign was to be used only when others—swelling of spleen and cachexia—were present.)

A new era opened when Ehrlich (*Zeitschr. für klin. Med.*, i., H. 3, p. 553, and *Farbenanalytische Untersuchungen zur Hist. u. Klinik des Blutes* Th. i. p. 51), announced that "an absolute increase of the eosinophile cells took place in leukæmia," or, as expressed in another place (Schwarze, *Inaug. Dissert.*, Berlin, 1880, and *Farben. Unters.*, p. 94): "The only pathological process in which the eosinophile cells are increased in mentionable manner is leukæmia. When one considers that the usual methods of examination frequently leave us in the lurch when the question between extreme leucocytosis or leukæmia arises, and when one considers that the beginning of this disease is almost beyond our diagnosis, the discovery (*Auffindung*) of eosinophile cells must be recognized as a grateful enrichment of our diagnostic methods."

The hope aroused by these statements, which were abundantly investigated, proved to be illusory, for many observers found an increase of eosinophile cells in various conditions quite different from those claimed by Ehrlich, and found them diminished (see below) in cases of leukæmia. But even before the observations alluded to were generally known, Ehrlich, through his pupil Spilling (*Inaug. Dissert.*, Berlin, 1880, and *Farb. Unters.*, p. 71), admitted that the appearance of mononuclear cells with neutrophile granules was more distinctive than that of either the eosinophile cell or the "Mastzellen" (which Ehrlich had at one time looked on as important).

Still later (*Char. Annalen*, Bd. xii., and *Farb. Unters.*, p. 129), Ehrlich repeated this claim for the mononuclear neutrophile cells, though limiting their appearance to cases of myelogenic leukæmia ("Da nach meinen Erfahrungen die geschilderten mononucleären neutrophilen Zellen beim Erwachsenen unter keinen Umständen im Blut erscheinen, stellen sie das feinste und sicherste Reagent einer auf leukämischer Basis beruhenden Myelæmie dar, die auf diesem Wege schon in den ersten Anfängen mit Sicherheit erkannt und von jeder andersartigen Vermehrung der Weissen Blutkörperchen unterschieden werden kann.") At that time Ehrlich still claimed that the increased appearance of eosinophile cells was an additional sign of the same disease, "as the only place of formation of the cells in question is in the bone-marrow," although he admitted, as before, their occurrence in normal blood.

Soon after this, Müller and Rieder ("Eosinophilen Zellen im circulirenden Blut," *Arch. f. klin. Med.*, Bd. xlviii.), not only confirmed Ehrlich's claim regarding the mononuclear neutrophile cells, but went much farther. In the first place they identified Ehrlich's cell just named with the "Markzelle" of Müller, which the latter had in an earlier article shown to be the same as the myelocyte of Cornil, "cellule medullaire." (*Arch. f. klin. Med.*, Bd. xlviii., p. 47 *et seq.*)

While Ehrlich claimed his cell to be diagnostic of myelogenic leukæmia, Müller and Rieder held it to be so of leukæmia in general (*loc. cit.*, p. 119). "It is probable," they continued, "that the bone-marrow is always affected (a view which v. Ziemssen has also defended), although a slight change can easily be overlooked. We are therefore at present of the opinion that myelocytes will be found in all cases of leukæmia, even in the so-called lymphatic form."

In these two articles Müller and Rieder called attention to the important fact, previously overlooked, or not correctly estimated, that the eosinophile cells in leukæmia were remarkable more for appearing in unusual forms than in increased numbers.

They also gave the results of observations, confirming the earlier ones of Neumann (*Berl. klin. Wochenschr.*, 1878, No. 41, pp. 607 and 608), Cafavy (*Lancet*, 1880, ii. p. 769), and Löwit (*Sitzungsber. der kais. Akad.*

in *Wien*, 3. Abth., May, 1887), in regard to the diminished amoeboid motion of the leucocytes on leukæmic blood in the warm stage, and suggested this as an additional diagnostic point.

Very soon after giving out the statements regarding the myelocytes, Müller had reason to modify them. In a case of lymphatic leukæmia, in which, by the way, eosinophile cells were present only in the proportion of one to several thousand, the myelocytes were so scarce that Müller was led to believe that "in many cases of lymphatic anæmia they could be entirely absent." (*Arch. f. klin. Med.*, Bd. 1. p. 55.) The possibility was exemplified by a case observed by Rieder. This was a case of rapidly fatal lymphatic leukæmia, in which the proportion of white to red corpuscles rose to 1 : 12 (red 3,700,000). Most of the cells (about 90 per cent.) were lymphocytes. A very few normal eosinophile cells were found, but no myelocytes. There were, also, no nucleated red corpuscles. No myelocytes could be found in blood-forming organs, nor were mitoses present. The bone-marrow presented lymph-adenoid hyperplasia (Neumann). (Rieder, *Beiträge zur Kenntniss der Leukocytose*, etc., Leipzig, 1892, p. 38 et seq.)

It seems important to lay these facts briefly before the reader, on account of the confusion surrounding the subject and the necessity of indicating the difficulties attending the interpretation of the case under consideration. It seems important, too, because from the history of the eosinophile cell we may expect the myelocyte to be used, on the grounds of the early reports, long after its original advocates have changed their opinion as to its value. In fact, there is a distinct tendency even now to carry not only the diagnostic but also the pathognomonic value of this cell to an extreme not warranted by the facts. (I have not thought it advisable to mention in the body of the paper that the theory of Müller of the origin of the myelocyte is by no means universally accepted. Hayem, Löwit, and Troje (*Berlin. klin. Wochenschr.*, 1892, No. xii. p. 285), hold ideas opposed to those of Müller and differing among themselves. (The works of v. Limbeck, Rieder, and Hayem, and the articles cited above, can be referred to.) Recently Wertheim has brought forward, though very modestly it must be said, another cell claiming to be important in leukæmia—a spindle-shaped leucocyte. This must be even less distinctive than any other cell claimed to be specific (*Zeitschrift für Heilkunde*, 1891, pp. 308, 314).

From what has been said it might seem that the search for a specific cell in leukæmia has brought us back to our original position. But in the meantime we have learned some things that should make our disappointment thereat less keen. For this we have really to thank Ehrlich, whose painstaking and ingenious investigations have made possible all that has been gained, and who should, if for no other reason, not be held responsible for all that has been said in his name.

The advance alluded to is indicated in the following attempt to formulate a description of leukæmic blood :

It has a diminished number of red corpuscles, some of which have nuclei (normoblasts usually), though in some cases of lymphatic leukæmia there are no nucleated red corpuscles. The leucocytes are increased, usually to an extreme degree, and the increase is constant, though in some cases even great variations occur. The colorless corpuscles, in most cases, are characterized by the altered proportion of mono- and polynuclear forms, by the appearance of eosinophile cells in unusual numbers and of mononuclear neutrophile cells (Ehrlich, myelocytes, Markzellen of others). In some cases eosinophile cells and myelocytes are absent, or the former, if present, few in number (lymphatic leukæmia). *Most frequently and most characteristically, the cells vary more in size than those of the same classes in normal blood and in the so-called leucocytoses.* The leucocytes, especially the abnormal forms, show less active amœboid motion on the warm stage than usual. Less characteristic elements of leukæmic blood are poikilocytes, macro- and microcytes, "Mastzellen," karyokinetic figures in normal or abnormal cells, and Charcot's crystals (on standing).

This statement, which agrees in the main with the conclusions of Rieder (*loc. cit.*, p. 36), is based on a careful analysis of the recent literature of leukæmia, and the examination of several cases of that disease.

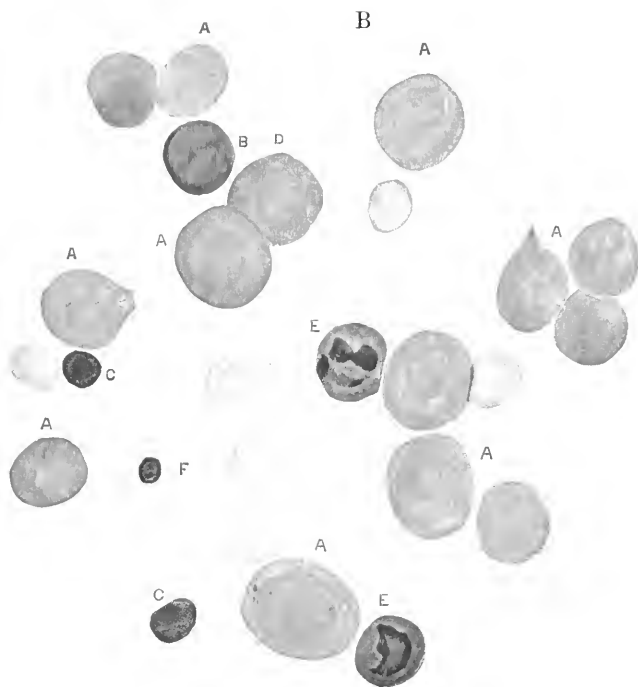
The difference in size of the corpuscles seems important. In a case of lymphatic leukæmia, in which small lymphocytes formed almost all the leucocytes, the only eosinophile cells found—not more than one in many hundreds—were not more than half the average size found in healthy blood.

In two cases of splenic-myelogenic and three of myelo-splenic leukæmia the very small and very large polynuclear forms were very striking. These are found in the (human) marrow in non-leukæmic diseases, but not, I believe, in the blood. With our present means of investigation, we must give up the idea of finding a new and specific cell in leukæmic blood.

The distinction between leukæmias depending on disease of one or another blood-forming organ, or of combinations of organs, cannot be made from the blood alone, although very accurate guesses can be made in some cases, especially by taking the other conditions into consideration.

The attempt to separate the lymphatic form of leukæmia from the others cannot yet be said to have been successful. Notwithstanding the difference presented in some cases, not only by the blood, but also by the clinical symptoms (rapid course), on the other hand, in other cases the usual clinical picture is presented; and transition forms and combinations occur so often that the unity of the leukæmic process cannot yet

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A. Pencilled section from the orbital tumor. Hardened in Mueller's fluid, stained with Bismarck brown drawn from the camera lucida on Zeiss stand, tube in, 1.12 imm., oc 3, at level of stage

B. Blood from finger-tip, heated one hour at 120°C , stained with methylene blue and eosin. *a, b*, large lymphocytes; *c*, small lymphocytes; *d*, large mononuclear; *e*, polynuclear; *f*, normoblast. The leucocytes were drawn from the central part of one field; the normoblast introduced from another field; only a few of the red corpuscles were drawn. Zeiss, 1.12, oc. 4, tube in; drawing 17 mm. below the stage.

C. Blood corpuscles in pulmonary vein (lung section). Hardened in absolute alcohol, cut in paraffin, stained with hæmatoxylin and orange G. Same conditions for drawing as in B. All the leucocytes in one group, but only three red corpuscles, were drawn.

D. Renal tubule with greenish-yellow pigment. Hardened in alcohol, cut unimbedded, stained with alumin carmine. Amplification as in B.

be abandoned. The statement regarding the size of the leucocytes applies only to those fixed in a thin layer—all the cells flat. In a layer in which rouleaux have formed, wet or dry, the largest cells may not seem larger than red corpuscles.

From the above it would appear that we should be able to recognize leukæmia in the earliest stage; but so far, I believe, this has not been done. Practically, we can see how tedious the necessary examinations might be.

We do seem, however, to have reached a stage at which we can claim to have criteria for developed leukæmia, though even for this we must await the confirmation that only time can give.

With this necessary digression, we can return to the consideration of my own case of chloroma, and study the blood, the characteristics of which, I believe, are peculiar.

The most striking forms are the large lymphocytes, which occur in the proportion of 65 per cent. These are from the diameter of a red corpuscle to three times that width (see Plate: figure B, *a*). In hæmatoxylin (Delafield's), they take a pale greenish-blue color; in methylene blue a pale blue, and in Ehrlich's "triacid" appear as clear spaces with hardly any color. Only the smaller ones (see Plate: B, *b*) stain well, though not so deeply as the small lymphocytes. These cells show no distinction between nucleus and protoplasm. Some of them take the methylene blue more strongly in narrow areas around the edge—not complete rings. In the fresh blood, these cells do not seem nearly so large as when dried.

Small lymphocytes occur in the proportion of 7 per cent. These vary slightly in size, as shown by the figure (B, *c*), stain well in all nuclear stains, are homogeneous or coarsely granular, and show (with hæmatoxylin-eosin only) a very narrow rim of protoplasm.

Normal mononuclear and transition forms are present to the extent of 8 per cent. ($1\frac{1}{2}$ and $6\frac{1}{2}$). They vary much in size. The nuclei of the transition forms usually stain well, those of the mononuclear less strongly. Mononuclear cells with neutrophile granulations cannot be distinctly made out. Out of a large number of covers stained with a mixture (Ehrlich's) that gave brilliant results with other specimens, Dr. Huber could find only three that were even suspicious. I thought I found two, but am very doubtful. They certainly were not typical.

Polynuclear cells form about twenty per cent. of the leucocytes. Their nuclei stain well, but the granulations are not as distinct as in normal blood. The cells of this class show the greatest variation in size. Those in the Plate (B, *e*), show the mean or normal; many are not more than half that diameter, a few are larger.

Normoblasts occur in proportion of two to five per thousand of red corpuscles (B, *f*).

Only one eosinophile cell has been found, out of many thousands of leucocytes. This was found by Dr. Huber, who with great patience carefully stained and examined a large number of imperfectly spread cover-glasses. I have recently gone over a large number of preparations without finding one more.

No mitoses can be found.

The proportion of white to red corpuscles, from a large number of fields counted is 24.74 : 100.

Certain points regarding the blood require special consideration.

The most numerous form of leucocyte is the large lymphocyte, the individuals of which vary considerably in size from those found in normal blood. They differ also from the latter in that, almost without exception, they show no protoplasms around the nucleus. This characteristic does not appear in the cells of the same class hardened in the bloodvessels. Figure C in the Plate was drawn with the same lenses and at the same level as B. It is easy to recognize in it the various kinds of leucocytes found in the fresh blood. In tissues hardened in various ways the results are the same so far as this feature is concerned. It seems rational to think that the peculiar conditions regarding the cells under consideration represent degenerative phenomena, although that does not advance our knowledge.

The small lymphocytes are increased, though not enough for us to say they exceed the normal limit. These cells differ so markedly in size and intensity of coloring from the large ones, that is easier to draw the line between them than in ordinary cases. Many of them look like free nuclei, especially the nuclei of normoblasts, but with hæmatoxylin and eosin a narrow rim of protoplasm may be made out. They never show the "grating" appearance.

The characteristics of the polynuclear and mononuclear cells have been sufficiently described. It is interesting to note the negative point, that the large cells of these classes having a faintly staining or clear protoplasm are very scarce.

The nucleated red corpuscles are all normoblasts. The large proportion of these cells is interesting in connection with other peculiarities of the case. In many respects this resembles lymphatic leukæmia. In the case of Rieder, mentioned before (*loc. cit.*, p. 40), no nucleated red corpuscles were found. Hayem (*Du Sang*, pp. 860, 864) has described a case of lymphatic leukæmia (red, 3,720,000; white, 476,200) without nucleated red corpuscles. Müller, in the case alluded to, found them, though few. In his case there was lymphoid bone-marrow. Wertheim (*Zeitschrift f. Heilkunde*, 1891, Bd. xii., p. 314) in a case of lymphatic leukæmia found none. (In this case the blood-count was—red, 2,525,000; white, 480,000, *i. e.*, 5.2 : 1; hæmoglobin, 55 per cent.). Thayer (*Boston Med. and Surg. Journ.*, February 23, 1893, p. 184) says that in lymphatic leukæmia nucleated red corpuscles are rare, and when present are often megaloblasts. (See Neumann, *Arch. f. Heilk.*, 1872, xiii. p. 507.)

It has been supposed that nucleated red corpuscles only occur in cases of leukæmia in which the bone-marrow is involved, but this seems irrational (see opposing statements of v. Limbeck, *Grundriss einer klin. Path. des Blutes*, 1892, p. 161, and Bizzozero and Salvioli, *Centralbl. f. d. med. Wiss.*, 1879). That the appearance of these cells depends on an irritation of bone-marrow in the sense of Ehrlich ("Ueber schwere anæmische Zustände," *Verh. des XI. Cong. f. in. Med.*, 1892, Sep. Abdr.,

p. 13) can easily be granted, but as both Neumann and Müller found these bodies in the liver in large numbers it is by no means necessary to assume that.

The almost total absence of eosinophile cells is noteworthy, because it too is common in the lymphatic form of leukæmia, but even more so because the eosinophile cell appears to be a normal constituent of blood. I have examined in vain for a case in which they were as scanty as in this one and in a case of lymphatic leukæmia alluded to above. Guttman (*Deutsche med. Wochenschr.*, 1891, No. 43, p. 1201) has mentioned a case of lymphatic leukæmia in which the spleen was also affected, in which only a single eosinophile cell could be found in a preparation. Wertheim (*loc. cit.*) found none. Müller in his case of lymphæmia (*loc. cit.*) found very few. Thayer (*loc. cit.*) in one case found only 0.1 per cent.

The absence of cells with basophile granulations in the blood, and their existence in the tissues in increased numbers, is interesting.

The absence of Charcot's crystals—the blood and pieces of liver and spleen were kept until putrid and examined daily with negative results—is another interesting feature in this case, especially in connection with the absence of other signs of disease of the bone-marrow.

The proportions of red and white corpuscles are worth emphasizing. Although it is true in many cases that in lymphatic leukæmia the increase of leucocytes is not so marked as in other forms, it is often considerable. In the cases of Müller, Wertheim, Hayem, and Guttman already quoted, the proportions were 1 : 6, 1 : 5.2, 1 : 8, 1 : 1.4.

We find, then, in chloroma, blood which in its altered character coincides with that found in leukæmia. The conclusion is obvious, but before drawing it, it is necessary to consider another phase of leukæmia—that expressed in the words, “the altered tissue-formation of the blood in its dependence on certain organs.”

It is often forgotten that we do not as yet know the origin of the leukæmic leucocytes, any more than of the normal ones. Efforts to explain the origin of leucocytes by facts observed in leukæmia, as might have been expected, have not made the subject any clearer, for observations have been interpreted in diametrically opposite ways.

The theory most widely accepted is that originated by Virchow and widened by Neumann, viz., that the leucocytes in leukæmia are derived from certain (hyperplastic) organs regarding which it is supposed, as the result of other observations, “that they stand in a certain relation to the formation of blood.” These organs are the spleen and lymphatic glands and the thymus (Virchow, *Path. Geschw.*, ii. p. 566), and the bone-marrow (Neumann, *Centralbl. f. d. med. Wiss.*, 1869, *Arch. f. Heilk.*, Bd. xi., *Berl. klin. Wochenschr.*, 1878, Nos. 6, 7, 9, 10).

The value of the evidence in favor of the splenic and lymphatic origin of leucocytes can be gathered from the fact that by many the bone-

marrow is looked on as the chief or only source of the excess of leucocytes in leukæmia.

This view or combination of views of the matter stands in direct contradiction to that of Kottmann ("Die Symptome der Leukæmie," *Inaug. Dissert.*, Berne, 1871), Biesiadecki (*Wien. med. Jahrb.*, 1876, p. 233), Löwit (*Sitzungsb. der k. Akad. in Wien*, 1885, Bd. xcii., Abth. 3), and others.

Notwithstanding the ingenuity and expertness with which Löwit defends his view, there can be little doubt that the view of Virchow-Neumann, at least in its broad outlines, will ultimately be shown to be correct.

But the latter view has been enlarged along with the increase of ideas of blood-formation, in the acceptance of the myelogenic form of leukæmia, and if we admit a participation of the organs mentioned, we must also admit the possible participation of the other known lymphoid tissues, the innumerable peripheral lymph nodules of the body. (See Flemming, *Arch. f. mik. Anat.*, Bd. xxiv.)

This brings up an interesting aspect of leukæmia, that relating to the so-called metastatic or heteroplastic growths, the history of which has been one of change.

Virchow originally (*Path. Geschw.* ii. p. 568), looked on these as heteroplastic neoplasms, so that "a sort of lymphatic tumor developed in organs in which normally no such formations occurred." The supposition that these were due to deposits of cells from the blood was rejected by Virchow, who held they originated *in loco*, as undoubted new formations.

But under the irresistible influence of the emigration doctrine Virchow's idea lost ground. This was hardly to be wondered at when men could go so far as, *e. g.*, Rindfleisch (*Lehrb. der path. Gewebelehre*, 1886, 6th ed., p. 211), who claimed a resemblance between leukæmic heteroplastic tumors and hemorrhages, though he held also that active emigration had some part in the process.

Bizzozero (*Arch. f. path. Anat.*, Bd. xcix. p. 378), however, revived the old teaching when he showed that active mitosis was going on in the secondary leukæmic tumors. His observations have been confirmed by Müller (*Arch. f. klin. Med.*, Nos. 48 and 50), and Wertheim (*loc. cit.*), and with the reaction now going on in regard to the extent of emigration in general, the true relation of the secondary leukæmic tumors is likely to be accurately determined.

Although it was believed very early (Virchow, Friedreich) that part of the leucocytes in leukæmia came from the secondary growths, but little importance has been attributed to those growths by later writers. Recently, indeed, if he is correctly reported, Virchow (*Berl. klin. Woch.*, 1892, No. 12, p. 289) has stated that the growths have no importance in the production of leucocytes, and that they are formed only in the

latter part of the disease. The question of early or late appearance seems to me to be a relative one, though it is true as a rule that the leukæmic lymphomata occur late in the disease.

But in regard to the possibility of some of the leucocytes being derived from the lymphomata, I think we must admit that the evidence is quite as strong as that regarding the origin of leucocytes from the spleen, thymus, bone-marrow, or peripheral lymph nodules.

Moreover, in many instances, it is difficult or impossible to say whether a given lymphomatous structure is hyperplastic or heteroplastic. In fact, when we consider the obscurity surrounding the development of the lymph nodules, when we remember that we do not know whether the lymph corpuscles are formed by division of similar ones in the nodules (Flemming), or are derived from the cells of the reticular tissue (Baumgarten), or the endothelium (Ribbert), and when we consider not only the possibility, but the strong probability of the origin of lymphocytes in the lymph spaces, we can see the need of a reconsideration of the secondary lymphomata.¹

From what we do know of the natural history of leukæmia and of chloroma we can see the analogies of the diseases. We can say that chloroma is a lymphomatous process similar in its clinical features to leukæmia and pseudo-leukæmia. Our ignorance of its precise relations depends partly on the fact that our knowledge of chloroma is very incomplete, partly on the indefinite nature of leukæmia and pseudo-leukæmia. Whereas in leukæmia and pseudo-leukæmia there is for the most part a hyperplasia of the lymphoid tissue with which we are most familiar, in chloroma there is hyperplasia, perhaps heteroplasia of tissue closely related to the others, but even less understood.

In endeavoring to learn more of chloroma we find ourselves facing problems of the greatest interest, but problems that at present cannot be solved.

In my own case the insignificant enlargement of the lymph glands, thymus, and spleen (the latter two being involved only by localized neoplasms), seems incapable of accounting for the large numbers of leucocytes. It is impossible to say that the bone-marrow was not altered, since all the bones were not examined, but on account of the condition of the blood and from the results in other cases we can exclude such a complication with much confidence. We can hardly avoid the conclu-

¹ The point just alluded to must be worked out without reference to differences between the lymphocytes and other leucocytes in circulating blood. The recent investigations into the rôle of the fixed cells in inflammation, especially those of Ziegler and his pupils, the renewed interest in the connective tissue or lymph-space corpuscle, the "dormant" cells of Shakespeare (*Medical News*, Philadelphia, 1882, vol. xl. 1), and "Schlummer Zellen," of Grawitz (*Arch. f. path. Anat.*, Bd. cxxvii., and *Berl. klin. Wochenschr.*, 1892), open up a promising field in all lymphomatous diseases.

sion, therefore, that the source of a large part of the leucocytes must have been the chloromatous growths. A careful examination of hundreds of sections of vessels of various kinds in the green tumors convinces me that no difference can be made out between the majority of the colorless corpuscles in the blood and lymph vessels and those in the adjacent lymphoid tissue.

If we assume that the cells have wandered out from the vessels we must suppose the excess of leucocytes was either produced in the vessels, or in blood-forming organs apparently little diseased. Moreover, the cells are such as least easily pass through vessel walls actively, and if forced through passively we should at least find many polynuclear cells in the tissue, which is not the case.

The absence of mitoses does not invalidate the supposition that the cells in the tumors have formed there (Bizzozero, *loc. cit.*).

To designate the cases as lympho-sarcoma adds nothing to our knowledge. Although it is no longer believed, as it was at the beginning, that in lympho-sarcoma there is never an increase of leucocytes in the blood, it is better in any case in which such an increase does occur to separate it from the category of sarcoma. Nor is it a gain to throw such cases in a distinct group along with those of lymphatic leukæmia, unless efforts to separate the lymphocytes from the other leucocytes genetically, are more successful in the future than they have been in the past, and even then the etiological factor might be a common one.

Looked at from every point of view, it seems better to class chloroma, for the present, along with leukæmia, pseudo-leukæmia, and myeloma, and to endeavor to work out its anatomical and clinical features on the same lines as those necessarily followed in the others.

Comparing chloroma with ordinary cases of leukæmia or pseudo-leukæmia, one cannot but be struck by the resemblance of the former to the process in those cases in which an insignificant epithelial tumor, primary in the uterus, gall-bladder, or intestines, produces early and enormous secondary growths in many organs.

Again, there is a striking resemblance to infectious (parasitic) processes. So long as we do not know whether leukæmia, as ordinarily met with, is due to vegetative excesses originating in the organism, or to irritants (parasites) from without, it is idle to speculate at length.

The clinical aspects of chloroma call up the possibilities of an infectious origin, which, of course, was suspected for leukæmia at the very beginning. In the case of Osterwald, which I strongly suspect to be one of chloroma, it was claimed that micro-organisms were found; but here, as in most of the cases of leukæmia and pseudo-leukæmia in which similar claims were made, the evidence is insufficient.

The symptoms of chloroma are so striking, and in many respects so uniform, that it is not only possible to make a diagnosis during life, but

in about half the cases it should be possible to do so at a very early period.

The important points in the diagnosis are: The appearance, usually below the age of twenty, of anæmia without evident cause, with loss of strength, dyspnœa and emaciation; hemorrhages in skin, mucous membranes (epistaxis), or internal organs (retina); rapid pulse; ocular symptoms, such as difficulty of vision, strabismus and especially exophthalmus, without the special features of Basedow's disease and with tumor in the orbit; deafness and ringing in the ears; and tumors under the temporals, or on the cranium in other parts, or in other parts of the body. Before the appearance of tumors the diagnosis would be doubtful, but after the appearance of tumors in the orbit and under the temporals, it could be made almost with certainty.

In such cases the blood should be examined by all the methods known, either to detect an increase or alteration of leucocytes already present, or, if that be not found, examinations should be made at short intervals in order to observe the possible advent of a leukæmic condition, which might come on only a short time before death.

The spleen, liver, lymph glands, and bones should be examined with reference to alteration in size and tenderness.

Although the essential points in the diagnosis were laid down by Huber, in no subsequent case was the disease thought of before death. It is to be hoped that, by calling attention once more to the subject, later cases may receive investigation directed to the elucidation of the many points yet unsettled.

THE ANATOMY OF THE VERMIFORM APPENDIX.

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I DESIRE to call attention to some of the surgical relations which this now important portion of the intestinal tube makes with its surroundings—based upon the examination of 74 bodies in the dissecting-room of this college.

The points which presented themselves to my mind were:

1. The position of the vermiform appendix in relation to the ileum.
2. Its relation to the colon.
3. The relation of the colon to pelvic cavities.
4. The length of the appendix.
5. The distance from the anterior superior spine to the base of the vermiform appendix.

6. The distance from the umbilicus to the base of the vermiform appendix.

7. Amount of mesentery:

(a) at juncture of vermiform appendix with colon;

(b) and its extent on vermiform appendix.

8. Distance from umbilicus to anterior superior spine.

9. Inter-iliac measurement.

To these might be added the distance from the anterior superior spine to the apex of the vermiform appendix, and the distance from the umbilicus to the apex of the vermiform appendix; but not having made a sufficient number of measurements on these points, I hesitate about placing any importance upon them. They are here appended, however, in the hope that others may be stimulated to add to them.

Of the 74 subjects examined, 56 were white males, 10 white females, 6 colored males, and 2 colored females.

Twenty-one subjects of the 74 gave evidences of pathological lesions about the appendix, divided as follows: 16 white males, 2 white females (one of whom had been operated upon), and 3 colored males.

The position of the vermiform appendix in relation to the ileum should be discussed, as—

a. Below the ileum, extending into the true pelvis.

b. Below and behind the ileum, extending into the true pelvis.

c. Below the ileum and remaining in the ventre of the ilium.

d. Below and behind the ileum, remaining in the iliac ventre.

e. Below the ileum and above the innominate crest.

f. Behind the ileum and above the innominate crest.

Of the 56 white males, 2 were below the ileum and extending into the true pelvis; 12 were below and behind the ileum, extending into the true pelvis; 12 were below the ileum and remaining in iliac ventre; 22 were below and behind the ileum, remaining in the iliac ventre; 7 were below the ileum and extended above the innominate crest, and 1 was behind the ileum and extended above the innominate crest.

Of the 10 white females, 2 were below the ileum, extending into the true pelvis; 2 were below and behind the ileum, extending into the true pelvis; 4 were below the ileum, remaining in the iliac ventre; and 1 was below and behind the ileum, remaining in the iliac ventre; and finally, in 1 the whole specimen had been removed after operation.

Of the 6 colored males examined, 2 were below and behind the ileum and extending into the pelvis; 1 was below the ileum and remaining in the iliac ventre; and 3 were below and behind the ileum, remaining in the iliac ventre.

Of the 2 colored females examined, 2 were below and behind the ileum, extending into the pelvis.

It will be observed that in 28 subjects—taking both races and sexes

together—the most frequent position for the vermiform appendix in relation to the ileum was below and behind, remaining in the false pelvis. The next most frequent was below the ileum, remaining in the false pelvis. In sixteen subjects the vermiform appendix was either below and behind the ileum, in the cavity of the true pelvis, and the remaining eight were either below or behind the ileum and above the innominate crest, *i. e.*, not in the false pelvis even.

The variations in the position, as is known, are accounted for by the development of the peritoneum, which allows or prevents the descent of the caput coli into the pelvis.

The position of the vermiform appendix in relation to the colon should be discussed as it starts on its inner, inner and posterior, posterior and inferior aspects.

Of the 56 white males examined, it occurred six times on the inner; forty-four times on the inner and posterior; four times on the posterior; and twice on the inferior aspects.

Of the 10 white females examined, it occurred six times on the inner and posterior; twice on the inner; and once on the posterior aspects; and one post-mortem removed.

Of the 6 colored males examined, it occurred five times on the inner and posterior, and once on the inner aspect.

Of the 2 colored females examined, it occurred in both instances on the inner and posterior aspects.

It will be observed that in 57 subjects the position of the vermiform appendix was on the inner and posterior aspects of the colon, and in the order and number of frequency—inner, eight; posterior, six; and inferior, two.

The position of the colon in relation to the pelvic cavities should be considered in four different ways, *viz.*: In the ventre of the ilium. In the ventre of the ilium, extending into the true pelvis. Above the ventre, and in contact with abdominal viscera.

The colon was observed in 56 white males, in the ventre of the ilium, forty-four times; in the ventre, extending into the true pelvis, eight; above the iliac ventre, three; and in contact with lower surface of the right lobe of the liver and on top of the right kidney, once.

In the 10 white females it was found in the iliac ventre, seven times; and in the iliac ventre, extending into the pelvic cavity, twice; and one post-mortem removed.

In the 6 colored males the colon was in the iliac ventre, three times; in the iliac ventre, extending into the true pelvis, twice; and in contact with the liver, once.

In the 2 colored females it was observed in the iliac ventre, twice.

There are, therefore, 56 subjects in which the colon occupied the ventre of the ilium; 12 in which it extended into the true pelvis from

the iliac ventre; and 2 in which it was attached to abdominal viscera. All these variations in the viscera depending upon peritoneal support, depend upon two facts: the amount and rapidity of development of the peritoneum and the varieties of food taken by the individual early in life while the intestinal tube is most sensitive.

The length of the vermiform appendix was measured—

In white males, 56 times: maximum 17 cm.; minimum 2.5 cm.; average, 9.09 cm.

White females, 9 times: maximum, 9 cm.; minimum, 2.5 cm.; average, 6.7 cm.

Colored males, 6 times: maximum, 16 cm.; minimum, 7 cm.; average, 11.2 cm.

Colored females, 2 times: maximum, 11.5 cm.; minimum, 7 cm.; average, 9.2 cm.

Of the total number, 73 subjects, the average length was 8.97 cm.

The distance from the anterior superior spine of the ilium to the base of the vermiform appendix was observed—

In white males (55): maximum, 16 cm.; minimum, 3 cm.; average, 7.5 cm.

In white females (10): maximum, 10 cm.; minimum, 4 cm.; average, 7 cm.

Colored males (6): maximum, 10 cm.; minimum, 5 cm.; average, 7 cm.

Colored females (2): maximum, 7.5 cm.; minimum, 6 cm.; average, 6.7 cm.

The average measurement for all classes, distance from anterior superior spine to base of vermiform appendix, 7.2 cm.

The distance from the anterior superior spine of the ilium to the apex of the vermiform appendix was only taken twenty times. White males (15): maximum, 20 cm.; minimum, 1 cm.; average, 8.5 cm. White females (3): maximum, 11 cm.; minimum, 3 cm.; average, 7.3 cm. Colored males (2): maximum, 11 cm.; minimum, 7 cm.; average, 9 cm. The average measurement for all classes, from the anterior superior spine of ilium to apex of vermiform appendix, 8.3 cm.

The distance from the umbilicus to the base of the vermiform appendix was observed in 46 white males, with a maximum of 15 cm.; minimum, 4 cm., and average, 7.8 cm. In 8 white females, with a maximum, 14 cm.; minimum, 5 cm.; average, 9.1 cm. In 5 colored males, with a maximum, 13 cm.; minimum, 8 cm.; average, 10 cm. In 2 colored females, average, 11 cm. The average distance from the umbilicus to the base of the vermiform appendix, 8.1 cm.

The distance from the umbilicus to the apex of the vermiform appendix was observed in 8 white males, with a maximum, 20 cm.; minimum,

3 cm.; average, 10.1 cm. In 3 white females: maximum, 15 cm.; minimum, 8 cm.; average, 11 cm. In 2 colored males: average, 9 cm. The average distance from the umbilicus to the apex of the vermiform appendix for all classes, 10.1 cm.

The amount of mesentery measured at the juncture or commencement of the vermiform appendix and the colon was taken in 55 white males, the maximum being 10.5 cm.; minimum, 5 mm.; average, 2.85 cm. In 4 white females: maximum, 4 cm.; minimum, 2 cm.; average, 3.1 cm. In 4 colored males: maximum, 3.5 cm.; minimum, 5 mm.; average, 2.1 cm. In all classes, mesentery at the beginning of vermiform appendix, 2.78 cm.

The amount of mesentery on the vermiform appendix and its extent thereon from the base to the apex was measured in 37 white males, with a maximum length of 10.5 cm., a minimum of 5 cm., and an average of 4.7 cm. Other measurements were taken in two instances in each of the other classes, but do not give any data to work upon. The average, however, is 5 cm.; *i. e.*, this is an average amount of mesentery that may be found, supposing that the length of the appendix is 8.91 cm.: or, about one-half its length.

In sixteen white males the mesentery extended the whole length, also in seven white females, in one colored male, and in one colored female. In two subjects it was so bound down that no measurement could be taken at all, and in one subject there was no mesentery whatever.

This great variation in the amount of mesentery belonging to the appendix would lead me to this conclusion, namely, that one must always expect to find a mesentery extending more than half the length of the appendix, and that from its free extremity one must expect great latitude of position—which may be assumed both on account of its length and also on account of the manner in which its mesentery is attached.

The distance from the umbilicus to the anterior superior spine of the ilium was taken in white males forty-nine times, with a maximum of 18 cm. and a minimum of 10 cm., the average being 12.4 cm. In white females, eight times, with a maximum, 15 cm., and a minimum, 12 cm.; the average being 13.7 cm. In colored males four times, with a maximum, 15 cm.; minimum, 12 cm.; average, 13.7 cm. In colored females twice, maximum, 19 cm.; minimum, 15 cm.; average, 17.2 cm. The average for all classes, 12.8 cm.

It goes without saying that in multiparæ this measurement should be considerably changed, but that in the male the change in adult life would not occur until adipose tissue became decidedly developed.

The inter-iliac measurement, from one anterior superior spine to the other, was taken in 50 white males, with a maximum of 30 cm. and a

minimum of 19 cm., the average being 22.4 cm. In white females seven times, with maximum, 25 cm.; minimum, 22 cm.; average, 23.3 cm. In colored males six times, with maximum, 25 cm.; minimum, 21 cm.; average, 23 cm. In colored females twice, maximum, 21 cm.; minimum, 20 cm.; average, 20.7 cm. The average for all classes, 22.5 cm.

It was, of course, impossible to obtain very accurate histories of the bodies examined, consequently it is impossible to verify certain points which, from these investigations, would naturally arise. I have therefore confined myself to visible topographical points.

1508 PINE STREET

MASSAGE IN MUSCULAR RHEUMATISM, AND ITS POSSIBLE VALUE IN THE DIAGNOSIS OF MUSCULAR RHEUMATISM FROM NEURITIS.

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THE muscles of the lumbar region and their fascia are a favorite seat for muscular rheumatism, which is then called lumbago, as everyone knows. This may arise from catching cold, from strain, from fatigue, or from rheumatism in the system. The pathology of this affection is probably coagulation of the semi-fluid contractile muscular substance and adhesion of muscular fibrils, so that attempts at motion are accompanied with partial, irregular, and painful contractions. Retention of waste products occurs, and it is pretty generally conceded that uric acid is the worst of these, thus adding "fuel to the fire" and pressure upon nerve filaments. Recent cases of muscular rheumatism are sufficiently common to anyone engaged in the practice of massage. They are almost invariably cured by a few massages, sometimes by a single massage. The same result may be brought about by rest, by warmth, by electricity, or by the administration of medicines that eliminate uric acid, such as salicylate of soda, though I think not so soon. Any of these may be used separately, combined, or with massage, thus affording us a choice of one hundred and twenty combinations of these five measures ($1 \times 2 \times 3 \times 4 \times 5 = 120$). But which of these is the most effective single agent could only be determined by the skeptical if they could have lumbago or muscular rheumatism sufficiently often to try each one separately, and massage last of all; for in therapeutics this is a science of experience, and not one of experiment, as it would be in physiology when tried on healthy persons. A wearisome detail of cases

of recent muscular rheumatism successfully treated by massage is unnecessary. It is the object of this article to show that in these, massage produces changes in five different ways: mechanical, thermal, electrical, nervous, and chemical. The *mechanical* change is shown by muscular rigidity being replaced by suppleness and elasticity, minute adhesions having doubtless been detached and the coagulation of the muscular substance replaced by the semi-fluid condition. The matting together of skin, superficial fascia, and deep fascia is also removed by appropriate massage, so that the skin glides more freely over the tissues beneath it. The pressure of the previous turf-like condition is taken away from the vessels and nerves so that patients feel lighter and more supple and freer from restraint. The *thermal* change is evident from the increase of heat, imparted from the hand of the manipulator as well as that arising from the massage and from the accelerated circulation. The *electrical*, also an objective change for which we do not need to take the patient's word, is manifest by more vigorous and agreeable contraction of the muscles to the faradic current after massage than before. For the *nervous* change we have to take the patient's word for improved sensation in the disappearance of pain, discomfort, and the feeling of stiffness. The *chemical* is inferred from the removal of waste products and uric acid, by the increased circulation and flow of lymph, which in plain language removes the ashes, flushes the *sewers*, and takes away asphyxiated juices, while the increased arterial current brings a greater supply of nourishment; otherwise improvement would hardly take place. The constipation of the tissues is got rid of, let the refuse matter be what it may.

Dr. Haig has shown pretty conclusively¹ that when chilling of the surface checks the excretion from the skin, diminution of the alkalinity of the blood and retention of uric acid take place in the tissues beneath. The same result follows when fibrous tissues have been injured, strained, or excessively fatigued: uric acid accumulates in the affected parts, superadding its irritating properties, and this may be abstracted from the blood to such an extent as to show an increased alkalinity of the urine owing to diminished excretion of uric acid. This condition can be got rid of by salicylate of soda, or by alkalies. When recent, it can also be more promptly dispelled by means of massage, thus showing that this has brought about chemical changes. If massage and alkalies, or salicylate of soda, be used simultaneously, the medicine will act more quickly by reason of the improved circulation resulting from massage—as most, if not all, medicines do when the case is such as to admit of massage. This is a fact too often unrecognized, and frequently redounds unduly to the credit of massage; as when a

¹ In the London Practitioner for March, 1891.

patient has for a long time been taking a remedy that is clearly indicated, but shows no improvement until massage has been used. On this subject let us hear from old Fuller, in his *Medicina Gymnastica*, published in 1771: "It is to be considered that some medicines may require exercise (of the patient) in order to enhance their virtues or to remove some inconvenience attending their operation which might deter people from using them so freely as they ought to do. The ordinary circulation of the blood may not suffice to answer the nature of some medicaments and call out their efficacy. Exercise in such cases is like the just and exact incubation to the egg—that which animates the drug and gives it power to produce the desired effect."

It is hardly necessary to state here that whatever treatment be adopted for acute muscular rheumatism, the diet should be regulated, and highly nitrogenous foods and acid wines interdicted for a time.

Zabludowski, Hopadze, and others have found by careful observation that general massage on healthy people increased the excretion of urates and phosphates, and the assimilation and metamorphosis of nitrogenous food substances.

As to the mechanical effect of massage, we might learn a lesson from nature. Adhesions of the pleura are often detached by the rubbing together of the two membranes in respiration. The fascia of muscles is a sort of pumping arrangement by which lymph is sucked out of the muscles and propelled onward into the lymphatics. It consists of two layers, between which are lymph spaces terminating in lymphatic vessels. When the muscles contract, the inner layer is pressed against the outer and forces the fluid onward into the lymphatic vessels. When the muscles relax, the inner layer recedes from the outer and the lymph from the muscles finds its way into it and the lymph spaces between. Hence by the contraction of muscles, waste products are washed out of them by the flow of fresh lymph. But patients with a severe attack of lumbago cannot exercise. In such cases, massage is more than a substitute for exercise, so much more, indeed, as the pressure of massage may be greater than the pressure which muscles make upon each other during contraction. In my *Treatise on Massage*, I have not only described the manner of using massage in such cases, but also the effects of friction and deep manipulation in the direction of the lymph and venous currents. The veins and lymphatics are mechanically emptied, the blood and lymph are pushed along more quickly by the *vis a tergo* of massage, and these fluids cannot return by reason of the valvular folds in the internal coats of these vessels. More space is thus created for the returning currents coming from beyond the region *masséed*, and the suction power induced at the same time adds another accelerating force to the more distal circulation. In brief, the effects

may well be likened to the combined influence of a suction and force pump, and in people that are not too fat the veins can be seen collapsing as they are emptied and filling up again as their contents are pushed along by the hands of the manipulator. In this way the collateral circulation in the deeper vessels is aided and relieved, as well as the more distal stream in the lymphatics, capillaries, and arterioles. One would naturally suppose that the circulation in the larger arteries would in this manner be interrupted, and such is the case. But herein comes an additional advantage to aid the circulation, for the temporary and momentary intermittent compression causes dilatation of the arteries above the parts pressed upon, from an increased volume of blood, and as soon as the pressure is removed this accumulation rushes onward with greater force and rapidity into the partially emptied continuation of the arteries, in consequence of the resiliency of the arteries and the force of the heart's action upon the accumulated volume of blood.

The difference in the consistency of muscles is of much interest. The muscles of some very strong people are soft and flabby when relaxed; of others, hard and firm. This difference is no indication of muscular power or the want of it. It is due to the condition of the fascia that surrounds the muscles. When this is thick it gives a feeling of hardness; when thin, of softness. The contractile substance of muscle is semi-fluid, as has been shown by Kühne. The same difference exists in dogs and other animals. The muscles of short-haired dogs are usually hard and firm; of long-haired ones, soft and flabby; and Ludwig has shown that the former yield much lymph, the latter little. Lauder Brunton is of the opinion that this difference in the deep fascia may account for the tendency to muscular as distinguished from articular rheumatism. Where muscles are soft from thin fascia, the tendency to muscular rheumatism is probably greater; whereas persons whose muscles feel hard from thick fascia most likely have a tendency to articular rheumatism. When the fascia is soft and thin the products of waste from over-exertion or other causes would incline to remain and occasion muscular pain; when the fascia is hard and thick, waste products would be removed more quickly from the muscles and might give rise to inflammation of the joints.

I think there must be much truth in Dr. Brunton's opinion, for I have seen cases of muscular rheumatism where the muscles felt preternaturally firm and hard, so much so that one might imagine that a quantity of plaster-of-Paris had been injected under the skin and allowed to set, which under massage became soft and supple as they improved. The following case, though a somewhat obstinate one, is an example of this:

CASE I.—Mr. J., a large, stout gentleman, had been subject to attacks of rheumatism in the trapezius, deltoid, or lumbar muscles all his life. At one time he was seized suddenly and severely with pain in the lumbar region, so that he could not even attempt to move. I was called to him the first day of this attack, and found all the muscles of his back, but especially those of the lumbar region, rigid, hard, and board-like, and almost insensitive to pressure. Perhaps the lessened sensation to external impression was owing to the already existing severe pain. Issues of vast importance depended upon his recovery in a short time, so massage was given twice daily for a week. At the end of this time the muscles were supple and elastic, sensitive, even tender to pressure; but the pain had disappeared and the patient could move freely.

Treatment is sometimes used to prove the diagnosis, as when iodide of potassium is given in cases of doubtful syphilis. Reasoning in the same way, Dr. Haig asserts that when any local irritation is not increased and made worse by acids given to the extent of distinctly raising the acidity of the urine and diminishing the alkalinity of the blood, or is not improved by alkalies given to the extent of decided diminution in the acidity of the urine or increase in the alkalinity of the blood, or by a salicylate given to the extent of producing a great increase in the excretion of uric acid, then such local irritation is not directly due to uric acid.

In the same manner I would venture the suggestion that when a case of apparent muscular rheumatism does not only yield but also does not stay improved after a few massages, then the probability is that the case is one of neuritis affecting the nerve fibres that supply the impaired muscles. This probability would be strengthened when the pain is uniform, affecting the same muscles on both sides, when it is worse at night whilst the patient is at rest and warm in bed, and better when up, moving about, which calls into play the inhibitory action of the will; whereas muscular rheumatism is aggravated by motion and relieved by rest and warmth. The difference in favor of neuritis would be increased when the consistency of the affected muscles does not differ from that of the well muscles or is somewhat diminished. Of course, it is not a question here of marked cases of neuritis where the pain is confined to one or more nerves and their distributions, with atrophy of muscles, altered electrical reactions, glossy skin, etc.

The relief from discomfort, and freedom of motion experienced after each massage in those cases which are too apt to be snappily diagnosed as muscular rheumatism, but most likely are neuritis, is so great that, though the temporary improvement may not be held, yet the patient is apt to demand that the massage be continued until the ultimate result, which, with appropriate internal medication, should be recovery. The following cases may be cited as examples:

CASE II.—Mr. D. was sixty-three years of age, and had always enjoyed good health, with the exception of frequent attacks of asthma. He was well nourished, having a due proportion of muscle and adipose. He came to me in July, 1887, suffering with stiffness and discomfort of the shoulders and hips, of several weeks' duration. This first showed itself in the hips. By reason of this discomfort he was restless and uneasy at night. At first sight the trouble seemed to be entirely muscular, and this view was strengthened by the result of treatment, for he had massage and passive motion early every afternoon nine times in succession, and after each massage he could bend over freely and rise from a chair without the assistance of his arms, cross each leg over the other with ease, tie his shoes, and dress himself, even to putting on his coat, as if there were nothing the matter with his shoulders, all of which he could not do before massage. This improvement continued the remainder of the day, but, unfortunately, next morning he was almost as stiff as ever. Though his deltoids and glutei did not appear to be altered in consistency, yet, after massage, they were much suppler and afforded corresponding freedom of motion. Evidently this patient ought to have had massage twice a day, so that the effect of one *séance* would not have been gone before he had another; but instead of this there was an interval of ten days in which he had none and grew rapidly worse. Then he had massage every other day three times, with but slight temporary improvement after each time. After this he tried travelling three weeks, during which he was drowsy and depressed, and came back worse than when he went away, so that it was with great difficulty that he could raise either foot high enough to get into a carriage—indeed, he had to ask his coachman to help him raise the leg for this purpose, and it was hard work for him to get into his coat even with assistance. He stooped like an old man. Pains in the fingers had also set in, so that it was difficult for him to hold a book. The muscles of the shoulders and upper arms, of the hips and thighs, had become somewhat atrophied and flabby, with diminished reaction to both galvanic and faradic currents, and increased irritability to percussion. Pressure on the large nerve trunks and muscles showed no tenderness. He was about four months getting into this, his worst condition, in which he remained for three months, and, he was five months, or the balance of a year, getting well. During this time, as if by way of compensation, his asthma scarcely troubled him. He continued to get about and attend to business even at his worst. He had electricity occasionally in the daytime, and massage almost every evening on retiring, which gave him much relief and comfort and aided him to sleep better. He is firmly of the opinion that massage aided his recovery and shortened his suffering by at least one year.

This case was undoubtedly one of neuritis, and what is of the greatest interest is the fact that just before his first symptoms appeared he had been taking five drops of Fowler's solution of arsenic three times daily for six weeks for his asthma. Five months later arsenic was found in the urine in large quantities by Prof. E. S. Wood. During his recovery, the patient, on his own responsibility, took a secret preparation containing arsenic and hydriodic acid for his asthma. The neuritis that was most likely left by the arsenic in the first instance was probably benefited by the arsenic in

the secret preparation, and so thought an eminent neurologist, under whose care he was for a while.

CASE III.—Another case, very similar to the foregoing, came to me in September, 1891. It was that of Mr. C., sixty-seven years of age, weighing 168 pounds, who, though of pale complexion, had red lips, and had enjoyed remarkably good health all his life. Ten or twelve years before, he had slight lumbago. For about four weeks pain and stiffness in the shoulders and hips, at the back of the neck, and between the shoulders, had been gradually increasing, so that it was not easy for him to put on his coat or button his shoes. He was worse at night after he had been in bed some time, and also in the morning, but improved somewhat after getting up and moving about. Every patient is a standard for himself as to the consistency of his tissues, and, so far as could be judged through this patient's adipose, the muscles seemed to be somewhat doughy and flabby, especially the deltoids and glutei. Those of the upper arms and thighs were apparently slightly atrophied and deficient in contractility to the faradic current. His appetite was not very good, and he had not taken a vacation for many years. Salicylate of soda had been thoroughly tried without any result. The immediate effect of massage from the first was magical, affording comfort and freedom of motion the remainder of the day on which it was given, which again led us to think the trouble altogether muscular. But his nights were still bad, and in the morning he was as stiff as ever. The longer he slept the stiffer he became. He continued the massage faithfully for eleven weeks, daily or every other day, always with great temporary relief, but, on the whole, gradually becoming stiffer and more uncomfortable. Iodide of potash, tonics, and the faradic current were in turn faithfully tried with the massage, but did not afford any more relief than massage alone. Ten grains of phenacetine in the evening and ten more when he wakes at night will give him a good night and a comfortable day after. But he has to omit this for a day or two before it will have this effect again. Five or six weeks after I first saw him, pain, stiffness, and thickening gradually came in the fore and middle fingers of the right hand, and the pain was also distinctly traceable in the course of the radial nerve.

I referred this patient to Dr. E. G. Cutler for further internal treatment, and under iron and cod-liver oil his general condition has improved and his appetite is better. For a month he has done nothing for his joints and muscles, and they remain in about the same condition. He requires assistance to dress. Like the preceding case, this gentleman attends to business at his worst. His own opinion is that if he could have massage on retiring its advantages to him would be much increased; but he lives out of the city. Unlike the preceding case, he is, so far, of a cheerful disposition. He has not been exposed in any way to arsenical poisoning; he has not taken any in medicinal form, and his wall-papers are free. He, therefore, regards it as superfluous to have his urine examined for arsenic, so it has not been done; neither has it for lead. He is a temperate man, so that alcohol does not enter into the case. Three weeks after he had been under massage the urine was examined by Dr. Cutler and found to contain a large normal amount of urea (12.25 grains to the ounce), due probably to increased tissue metabolism produced by massage. A large primary deposit of oxalate of lime crystals was also found. In other respects the urine was normal.

It is a pity that we are not absolutely certain that there is no arsenic in this patient's urine; for, if there be none, as most likely there is not, it would count strongly in favor of the arsenic found in the urine of the preceding case having nothing to do with producing his neuritis. As arsenic seemed to benefit the neuritis in the first case after the poison had been eliminated, then it might be a good remedy to employ for the second case. How much better arsenic may act while a patient is undergoing massage can only be conjectured. How much more quickly it may be eliminated while the patient is having massage is also a subject for consideration. Dr. G. Tedeschi¹ has reported a case of lead poisoning cured by massage after the usual treatment had failed. By this means he found that the urine was increased in quantity and the lead eliminated more promptly than by any other means.

CASE IV.—What is called rheumatism frequently affects both muscles and nerves. An acute case of rheumatic sciatica, intractable to the usual orthodox remedies, can sometimes be speedily changed for the better by means of massage, even when this does not afford such marked temporary relief as in such cases of neuritis as those just mentioned. In March, 1888, I was kindly asked by Dr. J. B. Ayer to visit his patient, Rev. B. H., fifty-eight years of age, who was well nourished, with tissues supple and elastic, except in the affected regions. He was then in his third attack of sciatica, or, more properly, rheumatic neuritis of the sciatic nerve, all three attacks having been traceable to his getting run down from overwork, and each attack having been preceded by lumbago, which faded away as the sciatica became more pronounced. The lumbago had affected the muscles on both sides; the sciatica, the right hip, thigh, and leg. The first attack had occurred eighteen years before and lasted for three months; the second came eight years after, and lasted for six months—worse than the preceding. The third attack had lasted severely for four weeks before I saw him, and, according to the same geometrical progression, we calculated and feared that he was in for a year of it, as anti-rheumatics, tonics, sedatives, galvanism and faradism had produced no sensible amelioration. We were agreeably disappointed, for, in four weeks and a half, under massage once a day, most of this time, with morphine when the pain became intolerable, he was, to all intents and purposes, well. Afterward, whenever he felt any premonitions of a returning attack, he had recourse to massage, a few applications of which has always afforded the desired relief. And this brings me to say that, when a patient has been benefited by massage, if a relapse or reappearance of the same trouble takes place, it is much more speedily relieved or cured by massage than it was at first; in other words, the patient has become more susceptible to its influence.

At the fifth visit massage was given to leg, thigh, and hip only, as the pain in the lumbar region had disappeared and suppleness of tissues had returned. The manner of using massage was by gentle stroking or *effleurage* on the posterior aspect of the limb, and deep, vigorous manipulation on the lateral and anterior aspects. Sometimes it is well to use deep pressure, so as

¹ Giornale interno delle Sci. Med.

to squeeze congestion out of a nerve, and then vigorous percussion over it, so as produce an obtunding effect; but these were out of the question at first in this case. The sixth massage seemed to rouse a slumbering soreness, and make the whole limb uncomfortable for an hour; but after this it felt better than before, and continued so. Subsequent massages after this had a similar effect. The reason of this was, without doubt, due to the detaching of adhesions which caused matting of the tissues. This required arduous work; but as suppleness and elasticity returned, the work became easier. At the twelfth visit, after forty minutes of massage to leg, thigh, and back, the patient felt that if I did any more it would certainly arouse the pain which the massage had just quieted. This was near the end of the third week, and he could run up and down stairs freely. And so the patient improved with interesting variations, pain decreasing and intervals of comfort increasing. On the thirty-first day after massage was begun he preached twice, superintended his Sunday-school (distributing presents to the children), and felt no worse for it. Sixteen massages in four weeks and a half, then a week's vacation, and he was himself again. But the external aspect of the leg, from the knee to the toes, has remained numb ever since.

Dr. A. Symons Eccles, in an article on "Massage, Rest, and Position in the Treatment of Sciatica,"¹ has reported several cases of sciatic neuritis in previously healthy people, which he treated successfully in this manner after the failure of other means. The massage consisted of *effleurage*, kneading, and percussion, and, in the intervals, the leg was suspended in a Salter swing, as this was the only position that afforded rest.

REPORT OF A CASE OF GANGRENOUS STOMATITIS, WITH A BACTERIOLOGICAL EXAMINATION.

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THE case reported in this paper entered the New Haven Hospital October 26, 1892, and was in the service of Dr. W. H. Carmalt, through whose courtesy I was permitted to make a bacteriological examination.

The patient, Katie M., seven years of age, was born in New Haven, of Irish parentage. There was no history of tuberculosis or any other hereditary disease in the family. The patient had lost no brothers or sisters, and her father, mother, and four brothers and sisters were living and well. Though she had been brought up in a tenement-house the hygienic surroundings had not been particularly bad. When two years old she had a fall, striking her face on a piece of board and driving a small sliver of wood into the left malar region. The wound

¹ London Practitioner, November, 1887.

suppurated and remained open for two months, but finally healed. Early in the summer of 1892 she had the whooping-cough. About the middle of September, 1892, she was taken sick with typhoid fever and was confined to her bed constantly from that time.

The present illness—*i. e.*, stomatitis—dates from the middle of October, 1892, when, the parents say, the patient had what they thought was an ulcerated tooth on the left lower jaw. The ulceration began in the gum, increased with great rapidity, and soon involved the inner part of the left cheek.

The patient was seen by Dr. T. H. Russell several days before her entrance into the hospital, who describes her condition somewhat as follows: Her left cheek had a round black necrotic patch about the size of a silver dollar, surrounded by a red, swollen, almost erysipelatous inflammatory area. The parents of the patient stated that the disease had

FIG. 1.



been apparently painless, and that the child was constantly picking at her teeth with her fingers, and finally pushed a finger through the necrotic patch on the cheek. After this the disease extended more rapidly, removing all the skin and muscular tissue of the left cheek and exposing the bone of the inferior and superior maxilla. The teeth on the exposed bones were loosened and fell out. The odor was extremely fetid. The appearance of the patient on entrance to the hospital can be better understood from the photograph than described.

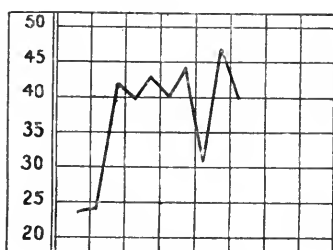
The remaining portion of the clinical history was mostly obtained from the hospital records.

On entrance, pulse 130, temperature 102.8°, respiration 25. Urine, specific gravity 1017; acid; no albumin; a considerable sediment of urates.

Oct. 30. The soft parts on the left side of the nose are almost completely gone to the median line. The cavity is bounded below by the lower border of the inferior maxilla, and above by the edge of the orbit. A large necrotic mass the size of a hen's egg was removed to-day. The tongue does not seem affected. Bowels and bladder act involuntarily. Patient lies in a kind of a stupor and does not seem in great pain.

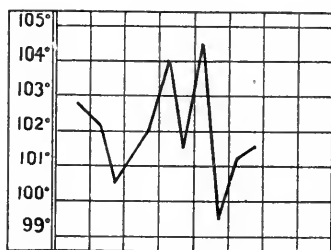
No record was made of the condition of the heart and lungs, though during the latter part of the disease the patient coughed considerably. Up to within two days of death she took nourishment well, taking over one quart of milk daily, and in addition wine whey and sherry wine. Occasional doses of Majendie's solution were given hypodermatically for relieving restlessness.

FIG. 2.



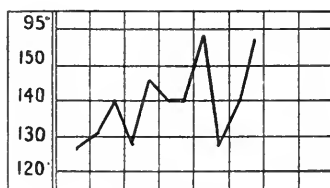
Respiratory chart.

FIG. 3.



Temperature chart.

FIG. 4.



Pulse curve.

The local treatment consisted in washing with Condy's fluid, and, in the application of charcoal poultices. Later, pure carbolic acid was painted about the necrotic area, but neither treatment had any effect in arresting the progress of the disease.

The patient died on November 1, 1892, about two weeks from the date of onset of the disease.

The causes of gangrenous stomatitis are predisposing and exciting. In infectious diseases the predisposing causes prepare the soil and the exciting causes furnish the infection.

The predisposing cause of gangrenous stomatitis is a weakened state of the body resulting from such diseases as measles and typhoid fever, combined with unhygienic surroundings. The exciting causes are local, and are not so plain. A necrosis is usually attributed to a disordered nutri-

tion, either from the cutting off of a blood supply by pressure, as in bed-sores, or by embolism or thrombosis; or from the cutting off of trophic nerve influence, as in ulceration of the cornea in animals when the fifth nerve is cut. None of these causes, however, either pressure, embolism, thrombosis, or neuritis, apparently are present in gangrenous stomatitis, and one is driven therefore to the conclusion that the local exciting cause producing the necrosis is the existence of some organism in the tissue which, either by its direct action or by the poisons it produces, causes a necrosis of tissue. But gangrenous stomatitis is not only a necrosis, but a gangrene—that is, there is not only death of the tissue, but putrefaction, and putrefaction requires the presence of bacteria of putrefaction, therefore it must be remembered that the bacteria producing the putrefaction are not necessarily the ones producing the necrosis. In fact, if we may trust the experiments of Lingard, the bacillus which he found in cases of gangrenous stomatitis produced a necrosis of the heart muscle in rabbits, but not a gangrene. It is quite possible that the putrefactive portion of the process in gangrenous stomatitis is produced by other bacteria. The cause of the necrotic process is, however, the most important, as necrosis is the primary change.

Our knowledge of the bacteriology of gangrenous stomatitis is based on the investigation of six cases—one by Schimmelbusch, and five by Lingard.

Schimmelbusch¹ found small bacilli, often in pairs, and sometimes in long filaments growing along the boundary line of the living tissue. These bacilli grew on gelatin without liquefying it, at the temperature of the room. They did not stain by Gram's method. When injected into rabbits, they produced local abscesses only.

Schimmelbusch did not prove that his bacillus had any etiological relation to the pathological process, but only made this hypothesis probable by finding the bacillus along the border of the healthy tissue.

Lingard also found a bacillus 4–8 micromillimetres long, probably the same as the one detected by Schimmelbusch, located along the border of the healthy tissue.² He found this bacillus constantly present in five cases, and cultivated it outside the body, though he does not state upon what media. When inoculated into the ear of rabbits it caused great swelling and redness, and death on the tenth day.

Examination of the viscera showed characteristic changes in the pericardium, which was covered with a false membrane in which bacilli were found. There were also patches of necrosis in the ventricular wall, containing bacilli. These changes are not found in the human heart. It is possible that the differences in the results of experiments on animals

¹ Manual of Bacteriology. Sternberg, p. 466.

² Lancet, 1888, ii. p. 159.

obtained by Schimmelbusch and Lingard may have been because the point of inoculation was different.

The examination of the case of gangrenous stomatitis which I have reported was begun on Oct. 27th, about four days before the death of the patient. It consisted in making smear cover-glass preparations, cultures, and animal experiments; of a microscopical examination of a portion of the healthy tissue bordering on the slough, which was removed after death; and of an examination of the blood.

I. *Cover-glass preparations.* After drying and flaming some were stained with carbol-fuchsin, some by Gram's method, some with Koch's alkaline methyl-blue, and some were treated with glacial acetic acid and a subsequent gentian-violet stain. In all the specimens there were vast numbers of staphylococci, streptococci, and diplococci, and a very few long bacilli, often in groups, stained faintly by Gram's method, but more deeply by other methods.

II. *Blood.* A special examination of the fresh blood was made to detect the motile crystal-shaped bodies described by Sansom, but none were found.

A blood-count showed about 1,600,000 red corpuscles to the cubic millimetre. The number of white corpuscles was 36,363 to the cubic millimetre, or about in the proportion of one white corpuscle to forty-four red ones. The amount of hæmoglobin was about 40 per cent. of normal. The white blood-cells were mostly polynuclear leucocytes, with a few mononuclear. Specimens stained with methyl-blue showed no bacteria.

III. *Cultures.* A small loop of sterilized platinum wire was pushed as deeply as possible into the sloughing tissue, twisted around, drawn out and rubbed successively over six or eight slant tubes of agar. Cultures were thus made on agar, glycerin-agar, and Weichselbaum's agar. In two or three of the last tubes inoculated the colonies were so few and well distributed that it was easy to make pure cultures as well as to distinguish different kinds of bacteria. Tubes of agar were also inoculated from the blood of the finger, but they remained sterile. All the cultures were kept at a temperature of 33°-35° C. Many colonies developed, from which pure cultures were made. These all proved to be micrococci, staphylococci, streptococci, and diplococci, but no colonies containing bacilli were discovered, even after repeated examination. The colonies most abundant proved, by growing in gelatin, to be the staphylococcus pyogenes aureus, the streptococcus pyogenes, and the micrococcus cereus albus.

My failure to detect bacilli may have been due to the fact that the platinum loop was not pushed into the border of the sound tissue, where the bacilli are by far the most numerous, but into the centre of the slough.

The cultures were fortunately made before any vigorous antiseptic treatment had been adopted.

The day before the death of the patient an attempt was made to make some fresh cultures, but no colonies developed in the agar tubes which had been inoculated. This was probably because a small portion of the

carbolic acid saturating the slough was carried over by the platinum loop into the agar tubes.

IV. *Animal experiments.* Two rabbits (No. 1 and No. 2) on October 28th were inoculated through a subcutaneous incision in the abdominal wall, well beneath the abdominal fascia, with a piece of slough from the face of the child.

Oct. 30. The rabbits seemed stupid and did not eat much. There was an area around the point of inoculation about one inch square, much reddened and swollen in each rabbit.

Nov. 5. Both the rabbits seemed much better, but the swollen, inflamed areas mentioned above were evidently the seat of abscesses. Pus could be pressed out of them. Cover-glass preparations were made from this pus, and cultures also. The cover-glasses after staining showed abundant micrococci and staphylococci, and a very few single long bacilli. Abundant colonies of the micrococcus cereus albus developed on the agar plates, and also another large egg-shaped micrococcus which in gelatin-tube cultures presented a rapid white superficial growth without liquefaction. No colonies containing bacilli were found.

15th. Both rabbits are alive and well. Small nodules at the point of inoculation about the size of a pea. All signs of acute inflammation have disappeared.

Rabbit. No. 1 killed. The nodule mentioned proved to be a cheesy mass encapsulated in a wall of tough connective tissue. There was no peritonitis nor sign of former peritonitis. The heart appeared normal both macroscopically and microscopically. Nothing worthy of note was discovered in any of the viscera.

A new rabbit (No. 3) was inoculated in the ear with some of the cheesy matter in the nodule removed from rabbit No. 1. This resulted only in a slight inflammatory reaction with no swelling and very slight redness lasting only a day or two.

The encapsulated cheesy mass which was removed from rabbit No. 1 was hardened and sections made. Sections were stained by Kühne's method. A few masses of micrococci in the connective-tissue cells were found near the border of the cheesy area. No bacilli were found.

V. *Sections made from the skin covering the malar bone of child.* A slough of skin covering the malar bone at the border of the necrotic area was removed after the death of the child. (No autopsy was permitted.) This was hardened in alcohol and imbedded in celloidin. Sections were made and stained by Gram's method, with carbol-fuchsin, and by Kühne's method. The last method showed up well the pathological process as well as the bacteria growing in the tissue. The sections, as a rule, presented three areas—an outer one of necrotic tissue, a middle one of infiltration with round cells, and an inner one of normal tissue. The bacilli were most abundant and stained most deeply along the border of the necrotic area. In the interior of the necrotic area they did not take the stain so readily. The single bacilli measured $2\frac{1}{2}$ micromillimetres to $3\frac{1}{4}$ micromillimetres in length, but were often joined end-to-end in long strings. These bacilli were, in many places, the only bacteria seen, and were packed closely together to the exclusion of all other bacteria along the line of necrosis. This gave one the impression that they were eating

directly into the sound tissue. In the necrotic area, especially near the outer part, were seen micrococci and streptococci.

The bacilli were not entirely confined to the necrotic area, but could be seen infiltrating the sound connective tissue, though in much less abundance than along the line of necrosis. The bacilli were stained especially well by Gram's method. In using this method, however, great care needs to be taken not to decolorize too much.

My conclusions differ from those of Schimmelbusch in that the bacilli found by him did not stain by Gram's method, and from those of Lingard in that his bacilli were somewhat longer than those which I found. These differences in staining peculiarities and size may possibly be ascribed to differences of technique which further investigations may harmonize.

The finding of a bacillus characteristic in appearance, staining with Gram's method, far outnumbering all other kinds, and growing in innumerable numbers along the border of the necrotic area, in one case, certainly does not prove that it is the cause of the disease. It does, however, confirm one of the conclusions of Schimmelbusch and Lingard, and in view of the scanty literature on the subject seems worth recording.

REVIEWS.

DISEASES OF THE EYE. A PRACTICAL TREATISE FOR STUDENTS OF OPHTHALMOLOGY. By GEORGE A. BERRY, M.B., F.R.C.S. Ed., Ophthalmic Surgeon, Edinburgh Royal Infirmary; Senior Surgeon, Edinburgh Eye Dispensary; Lecturer on Ophthalmology, Royal College of Surgeons, Edinburgh. Second Edition, revised and enlarged. With colored illustrations from original drawings. Pp. xxii., 727. Philadelphia: Lea Brothers & Co., 1893.

THE first edition of this work appeared in 1889, and now in only four years we have the pleasure of perusing the second edition.

We must at the outset say that this is by far the best work upon its theme in the English language that we have seen, for the diction is pure and clear, and besides, the beautiful illustrations of normal and diseased conditions make it a valuable addition to the library of all practitioners, general as well as special. We have never seen more real delineation of disease, the coloring is perfect, and each illustration is an "object lesson."

Another great feature is, that the illustrations are to be found in the natural course of the text, and one does not have to stop and refer to some plate at the back of the volume.

There are one hundred and ninety-seven illustrations, of which ninety-three are colored, being drawings from nature, made by Dr. Tatham Thompson, of Cardiff, and Mr. Sydney Stephenson.

The volume is divided into eighteen chapters, a general index, and an index of authors. Chapter I., "Examination of the Eye," is clearly and distinctly treated of in forty-seven pages, and we are pleased to note the practical way in which the author has grouped the facts; especially well stated are the ophthalmoscopic appearances of the optic nerve in health, and the many curious vascular changes of the nerve head, shown in six drawings. Under the changes in the fundus in the aged, we note the lack of transparency in the optic nerve, and its muddy or dull look without any pathological change; also a condition of depigmentation of the retina, which may occur in patches, admitting of the structure of the choroid coming into view: both of these conditions we have seen, but they are rarely mentioned by writers. In speaking of ophthalmoscopes, he says: "Many forms of this instrument are in use, differing mainly in the form of mirror and the arrangement for bringing the different lenses behind the aperture. But there is a tendency to multiply the number of lenses and introduce refinements in the mechanism of hanging the mirror, etc., which only add to the cost, without in the least increasing the practical usefulness of the particular ophthalmoscope."

In speaking of the "light streak" on the retinal arteries, the author accepts Dimmer's theory that it is due to reflection from the blood corpuscles of the axial current of blood.

Chapter II., "Diseases of the Eyelids and Lachrymal Apparatus" occupies thirty pages, and is most perfectly illustrated in color; especially good are the two plates showing the course and direction of the lachrymal duct. We can fully concur in the remarks on the treatment of lachrymal diseases, especially that in reference to large probes, where the author says: "I am convinced that they either do no good or are positively hurtful."

In speaking of the causes of "nictitatio" and "blepharospasm," we fail to note any mention of errors of refraction as a cause; we have frequently noticed such, and immediate relief when proper correction followed.

Chapter III., "Diseases of the Conjunctiva." In this chapter the usual mode of treatment is carried out that we are all so familiar with, and it is to be commended. We would take exception to the remarks on the use of jequirity, where he says: "It is certainly unjustifiable to use it in cases where there is not very great defect of vision on account of pannus, . . . as it is impossible to control the severity of the inflammation to which it gives rise." We believe, if the author had personal experience with this method of treating granular conjunctivitis, he would not so express himself, as we in this country find it of great service, and can fully control the resulting inflammation.

We notice also the failure to mention the method of treatment known as "grattage," which for the past few years has held full sway in certain quarters, although it is a method that will not stand the test of time.

"Electric-light Ophthalmia" is mentioned, and we only notice it to say that we wish authors would cease using the word "ophthalmia," unless they mean to express the idea that the whole tissue of the eye is involved in a general inflammation.

The article on "Keratitis" is particularly interesting; especially are we interested in the "dendriform" variety, of which a beautiful plate is shown.

Chapter V., "Diseases of the Crystalline Lens." Most interesting are the etiological facts narrated under this heading. Yet after all we come back to the old idea—summed up by the author thus: "It seems not unlikely that cataract in man is due either to circulatory disturbances in the nutrient fluid of the lens, or, though less frequently, to alterations in the chemical constitution of the nutrient fluid." In speaking of the operation of extraction of cataract, the author describes and is in favor of the method *with iridectomy*, and in speaking of the claims of those who prefer *no iridectomy*, for the reason of the resulting round pupil, says, "the game is, in fact, not worth the candle," with which we quite heartily agree.

The chapter on "Diseases of the Iris and Ciliary Body" is complete and richly illustrated, and the therapeutics up to the advanced methods employed in all our large ophthalmic hospitals.

Foreign bodies in the eye are treated in a very simple and conservative manner. If we had more of this kind of surgery promulgated we would have fewer sightless eyes.

When speaking of "Sympathetic Ophthalmitis," many things are said which go to show the author a close clinical observer and a safe leader; *e. g.*, "A soft eye, in which perforation, either from accident or ulceration, has at any time taken place, and which is tender to pressure, is that which endangers the safety of the other." Again: "A perforation which has arisen from within is not so liable to be followed by sympathetic ophthalmitis as one which has taken place from without."

After a full discussion of the pathology of this affection, he concludes by accepting the theory of the migration of germs through the lymph spaces from one eye to the other, as affording the most satisfactory solution of the problem.

Tobacco amblyopia is believed in by the writer; but we have yet to see or hear of the first case well authenticated: it must be that our English brethren use the "weed" more than we.

Section I. closes with an interesting chapter on "Hemianopia."

Section II. includes within one hundred and fifty pages "Errors of Refraction and Accommodation," and "Affections of the Oculo-motor Muscles." All the refractive conditions are treated in a simple and plain way, and also in smaller type are elaborated the formulæ and equations necessary to prove the result for those who wish to know the exact method by means of which conclusions are reached. This is of service, and meets the wants of the busy reader as well as the special student.

Javal's ophthalmometer (old model) is figured, and a description of the instrument given. The author says of it: "Though affording a simple and trustworthy means of calculating the amount of astigmatism, it has the disadvantage of being expensive." While this is partly so, yet the confidence felt by the examiner more than offsets the cost of the instrument.

An exhaustive chapter on "Convergent Strabismus," giving the different views advanced by various observers, concludes with the author's accepting the explanation of Hansen Grut, which makes squinting a mere phenomenon of *innervation*, and not due to any muscular defect, further stating that such explanation is but an extension to its natural conclusion of Donders' view.

Section III., "Operations," occupies the last sixty pages of the volume.

Antiseptic surgery is commended in its practical and common-sense way, but it is not believed in as a "fad." Thus: "Some few operators in Berlin attach importance to operating in an aseptic or supposed aseptic atmosphere. . . . Such precautions are simply an evidence of an inability to understand the true nature of the sources from which the risks of septic inoculation arise."

In speaking of the operations for advancement, Prince's operation is preferred with slight modifications.

In concluding this too hasty review, we cannot but reiterate what we said at the beginning, that we have had great pleasure in the perusal of this work, and great profit, and that we consider it the best on the subject in the English language to-day, not only for its diction, but for its instructive illustrations. The publishers have given excellent paper and type.

W. O. M.

RECENT CONTRIBUTIONS TO MEDICAL LITERATURE.

1. THE RETROSPECT OF MEDICINE: A HALF-YEARLY JOURNAL CONTAINING A RETROSPECTIVE VIEW OF EVERY DISCOVERY AND PRACTICAL IMPROVEMENT IN THE MEDICAL SCIENCES. Edited by JAMES BRAITHWAITE, M.D. Lond., Obstetric Physician to the Leeds General Infirmary, etc. Vol. CV., January-June, 1892; small 8vo., pp. xxi., 436. Vol. CVI., July-December, 1892; pp. xxii., 449. London: Simpkin, Marshall, Hamilton, Kent & Co., Limited.
2. THE DISINFECTION OF SCARLET FEVER AND OTHER INFECTIOUS DISEASES BY ANTISEPTIC INUNCTION. By J. BRENDON CURGENVEN, M.R.C.S., L.S.A., formerly House Surgeon of the Royal Free Hospital, etc. Read at meeting of the International Congress of Hygiene and Demography, held in London, August 14, 1891. 8vo., pp. 25. London: H. K. Lewis.
3. ON CONGENITAL OBLITERATION OF THE BILE-DUCTS. By JOHN THOMSON, M.D., Fellow of the Royal College of Physicians of Edinburgh; Lecturer on Diseases of Children, School of Medicine, etc. 8vo., pp. ii., 52. Edinburgh: Oliver & Boyd, 1892.
4. EPIDEMIC INFLUENZA: A STUDY IN COMPARATIVE STATISTICS. By F. A. DIXEY, M.A., M.D., Fellow of Wadham College. With diagrams and tables. 8vo., pp. xv., 29. Oxford: Clarendon Press, 1892.
5. DISEASES OF THE LUNGS, HEART, AND KIDNEYS. (No. 14 in the Physician's and Student's Ready-reference Series.) By N. S. DAVIS, JR., A.M., M.D., Professor of Principles and Practice of Medicine, Chicago Medical College, etc. Small 8vo., pp. vii., 359. Philadelphia and London: The F. A. Davis Co., 1892.

1. THE volumes of the *Retrospect* for the year 1892 present the profession with yet another proof of the merits which, for many years, have caused it to be a book of reference for the best medical literature of the day in a condensed form.

Naturally with so many articles by different authors, the degree of merit must vary greatly, but the articles that are not good are conspicuously few.

The present volumes, like those that have gone before, can confidently be turned to to furnish information of the latest advances in the medical sciences.

2. THE method of disinfection advocated by the author consists in smearing lightly the entire body of the patient night and morning with one of the essential oils, the best of which he holds to be the oil of eucalyptus. Better results are obtained, however, by combining two or three essential oils of different densities, since the air will then take up more of the combined vapor than when only one is used.

In the case of scarlet fever the inunctions are continued night and morning for three days. After the third day the skin is anointed only at night, after a warm bath, for seven days, when this treatment ceases and the patient joins the rest of the family.

In addition to the disinfection accomplished by this procedure, it is claimed that children become less restless and sleepless after inunction, and that the temperature drops several degrees, with a consequent lessening of the associated febrile phenomena. This latter result, however, can be obtained with any fatty or oily substance, as it is a well-known fact that free inunction of the surface with any fat, such as lard, for instance, will bring about a fall in temperature when pyrexia exists.

3. As the author rightly states in the preface to this monograph, there has never before been published a complete *résumé* of the recorded cases of this lesion. In the present work he has collected and classified forty-nine cases of this rare condition. By a series of tables, in which the clinical details and post-mortem appearances of these cases are clearly set forth, the value of the work is greatly enhanced. Indeed, the author may well feel satisfied that in this article he has presented the profession with a valuable addition to the literature of congenital malformations.

4. CONSIDERING the vast amount of literature that has been written upon the subject of epidemic influenza during the past few years, it is no small accomplishment to have composed an article that will undoubtedly assume a permanent place in the history of this malady.

The amount of labor which the author has expended in compiling the various tables of mortality, and other statistics, must have been enormous. Great as it seems to have been, however, it has been justified by the results attained. Unless we are greatly mistaken, the book will always stand as one of valuable reference for future investigators of this disease.

5. THE scope of a work of this kind is naturally restricted to the bare statement of essential facts concerning the various diseases with which it deals. Designed as a book of ready reference, the author has accomplished his purpose; it is one more added to the already numerous members of this class of medical literature. Nevertheless, the book will prove a useful possession to the hurried practitioner and student, especially as a reference for treatment, to which the author has given particular attention.

The work deserves success.

T. G. A.

AN INTRODUCTION TO THE STUDY OF DISEASES OF THE SKIN. By P. H. PYE SMITH, M.D., F.R.S., Fellow of the Royal College of Physicians, and Physician to Guy's Hospital, London. Small 8vo., pp. 408. Philadelphia: Lea Brothers & Co., 1893.

THIS handbook is, in the main, a reflex of the author's own observations in the domain of dermatological medicine, and as this experience has been a large one, the book will be found to contain much of practical value to the student and practitioner. The subject matter is given in a clear, readable, and terse style. A special feature is the introduction of diagrammatic woodcuts for illustrating the local distribution of certain diseases. The introductory chapter deals with special etio-

logical and pathological factors, and a short and instructive chapter is added at the end of the book on practical classification and diagnosis. An appendix containing formulæ, description of the common soaps, the various baths and mineral springs, is also given.

The publishers have well contributed their part toward giving the volume successful presentation.

H. W. S.

HANDBOOK OF MATERIA MEDICA, PHARMACY, AND THERAPEUTICS. By SAMUEL O. L. POTTER, A.M., M.D., M.R.C.P. Lond., Professor of the Theory and Practice of Medicine in the Cooper Medical College of San Francisco; Visiting Physician to St. Luke's Hospital, etc. Fourth edition, revised. Pp. xvi., 781. Philadelphia: P. Blakiston, Son & Co., 1893.

SCARCELY more than a year has passed since the reviewer carefully read the third edition of this book. The opinion of its merits which he then expressed has been verified by the favor with which it has been received by the profession. The present edition bears evidence of careful revision without presenting any departure from the original plan of the work. The sum total of the additions is fourteen pages, and yet this small addition by no means conveys a just idea of the improvements to be found. The newer remedies, as aristol, chloralamid, diuretin, phenacetine, and piperazine, are for the first time considered, and brief notices of phenolid, exalgine, salipyrine, and hypnal are found. We believe that this list could, with profit, have included salophen, hydrastinin, bismuth salicylate, and thiol. Many sections have been considerably enlarged, as those upon acetanilide, the treatment of alcoholism, of influenza, and upon drug eruptions. The appearance of the pages has been greatly improved, and study facilitated, by the more liberal use of display type. Very few typographical errors are found, in addition to those to which the author calls attention at the beginning of the book ("tincture of the chlorate of iron," p. 225). In the section devoted to patent medicines we find an increased number of formulas and a few changes in title. On page 741 the author presents a very valuable table for computing the dosage of active ingredients in each drachm of mixture, the total quantity of the ingredients and the amount of the mixture being known. The index has been increased to the extent of one-half of a page. The use of the former edition during the past year for study and reference has confirmed the opinion expressed in the review of that edition. "The author has very skillfully steered his course between the pessimism that marks a system of therapeutics based solely on the results given by experiments and observations in the chemical and physiological laboratories, and the optimism of hasty empirical generalizations upon meagre clinical data."

R. W. W.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE
MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

THE TREATMENT OF DYSENTERY BY IPECACUANHA *sine Emetinâ*.

DR. A. CROMBIE has treated seven cases of catarrhal dysentery with this drug. He directs rest in bed, a milk diet (preferably peptonized), and opium generally in the form of Dover's powder, combined with bismuth and soda bicarbonate, twice daily. No observations were made upon the severer kinds of dysentery, the so-called "diphtheritic" and amœbic forms. This remedy caused vomiting in a considerable proportion of instances; but the vomiting, when it did occur, was not so distressing as that caused by ordinary ipecac; and was not a bar to its administration; no laudanum was given to mitigate its effect, nor to detain its passage through the bowels. Its administration was followed by improvement and recovery in six out of the seven cases in which it was given. Neither form of ipecac shows, however, any special advantage in the treatment of dysentery as compared with that by means of bismuth and Dover's powder, which causes no distress whatever. If, however, driven to use ipecac, the preference should be given to ipecac *sine emetinâ*.—*Indian Medical Gazette*, 1893, No. 4, p. 106.

MASSIVE ALKALINE MEDICATION.

DR. HENRI HUCHARD shows that the alkalization by the administration of massive doses of bicarbonate of soda is without danger. The "alkaline cachexia" is not to be feared; many clinicians have not hesitated to administer bicarbonate of soda in doses of from two and one-half to seven and one-half drachms. A case is cited of a man seventy years of age, who for ten years received each day a dose of from five to six drachms of bicarbonate of soda dissolved in a bottle of water, and that for combating a dyspepsia caused by an excess of hydrochloric acid. For the past four years he has

ceased to take this remedy, and his alimentary tract is completely restored to health. It is an error to believe that an excessive amount of this alkali is capable of producing an atrophy of the glands of the mucous membrane of the stomach; it is rather the excess of hydrochloric acid that is responsible for this condition. This use of bicarbonate of soda is of great value in dyspepsia characterized by the production of an excess of hydrochloric acid, and even the amount mentioned above may be materially surpassed. In diabetes, either in the form of lime-water, or as bicarbonate of soda, or as tartrate of soda, this treatment is valuable, and, indeed, is the best preventive of diabetic coma, which is characterized as an acid intoxication of the blood, a true acidæmia. In the gastric crises of tabes this treatment has often been shown to be valuable, and as well in certain migraines known under the name of *gastroxie nerveuse*. In diseases of the heart and aorta, when this excess of hydrochloric acid coincides with hyposystole or asystole in mitral disease and in aortic affections, this remedy administered in massive doses has been followed by good results. In cutaneous diseases, especially in arthritic subjects, the condition of the blood is favorably influenced by this method. In disease of the liver and cholelithiasis, the alkaline treatment by Vichy water is well known, and especially when employed early and in large quantities is the cure rapid and successful.—*Revue générale de Clinique et de Thérapeutique*, 1893, No. 3, p. 35.

THE TREATMENT OF MYXEDEMA.

MR. ROBERT ALEX. LUNDIE believes that there are but few diseases so certainly amenable to treatment as this. A single case is reported. At first a real thyroid extract, representing two-thirds of a sheep's thyroid, was given hypodermatically, but as abscesses were caused, administration by way of the stomach was resorted to with equal success. Although this treatment always benefits the symptoms of the disease, yet it cannot be certainly said that it never does harm to the patient. Abscesses are by no means of infrequent occurrence when the remedy is introduced by the subcutaneous method. Other symptoms are due to later physiological effects, and have occurred after administration by the mouth. These may, in the main, be classified under the heads of—1. Weakness; 2. Pain; and 3. Nausea; all of which are mentioned as occurring in the case reported. Woodhead's experiments upon rabbits when he had injected various extracts of different glands showed that a marked effect upon the heart was produced, as very frequently degeneration of the muscular tissue ensued. It is certainly proper, then, to warn patients of the risk of unusual exertion, at all events in the earlier stages of the treatment. The author has collected from the literature a series of forty-six cases which illustrate the various methods of the administration of this remedy.

DR. G. H. MELVILLE DUNLAP reports six cases, in five of which, all women, the treatment was successful. In the sixth, that of a man, there was not much evidence of improvement.

DR. JOHN THOMPSON reports a case which ended fatally shortly after the commencement of the thyroid treatment. A woman, aged fifty-one years, had certainly presented symptoms of this disease for ten years. For many months she had taken thirty minims of tincture of jaborandi three times

daily, to relieve the annoying dryness of the skin. Of late this had ceased to be a distressing symptom, and the drug had been discontinued. She had suffered constantly from more or less dyspepsia, from chilliness, and from a distressing feeling of weakness and disinclination for exertion. Five months before commencing treatment she was ill from a severe pain, which began in the region of the heart and passed down the left arm, accompanied by severe dyspeptic symptoms. This recurred frequently for a few weeks, and then passed off, though it returned occasionally afterward in a less severe form. During treatment, after unusual exertion, these symptoms returned, but were relieved by the administration of nitroglycerin. The symptoms of myx-œdema were relieved, but she was very weak, and was sweating profusely; there was great nausea and much pain over the stomach. Later, this pain became more severe, and there was a constant inclination to vomit. Death occurred after suddenly fainting while sitting up. The necropsy showed that the muscular tissue of the wall of the heart was in a state of extreme degeneration, being pale and brownish in color and flabby in consistence, in many places being replaced by fibrous tissue, and in others by fat, owing to advanced atheromatous changes having obstructed the coronary arteries. The amount of thyroid used was certainly small (two and one-quarter sheep thyroids in three weeks), but one can scarcely doubt that it may possibly have had some influence in hastening the end.—*Edinburgh Medical Journal*, 1893, No. p. 996.

TREATMENT OF TYPHUS FEVER.

DR. DAVID CERNA advises perfect isolation in a well-ventilated room, scrupulous cleanliness, and thorough disinfection of all clothing and of the house. An absolutely healthy nurse, and one who has had typhus is to be preferred, should be selected, and he should have regular and proper nourishment and sleep and moderate alcoholic stimulation, especially by night. All utensils, before and after usage, must be thoroughly washed with boiling water; the hands of both nurse and patient disinfected with antiseptic solutions, and the vessels employed for the *dejecta* disinfected with great care. The alimentation should be of a liquid nature, chiefly of boiled cow's or goat's milk—two to two and a half pints in the twenty-four hours—to which tea, coffee, or orange-leaf water may be added. The free use of tea and coffee should be allowed, but in small quantities, frequently given. Later in the disease, and especially during convalescence, chicken and other animal broths, eggs, beef-tea, are given. The latter is administered twice a day—at noon and at night—with all due regularity. Fruit, such as baked apples, oranges, and the like, is sometimes allowed, with, of course, the necessary precautions. Care must be taken not to overload the stomach. Before and after the ingestion of food the mouth of the patient is thoroughly cleansed with a soft cloth moistened in a mixture of equal parts of distilled water and lemon-juice. Between meals the mouth may be washed with alkaline solutions. Thirst may be relieved by means of acidulated drinks. Above all, typhus fever requires a great deal of attention to be paid to alimentation, and the high mortality of epidemics is due chiefly to lack of proper nourishment. The treatment is mainly expectant, but the chief object is to keep up the

strength of the patient. Alcohol is one of the principal agents to be used from the outset. Good brandy, with sufficient sugar, in distilled water, to half a pint a day, or more, if the patient is unable to take food, is an efficient combination. Alcohol can also be used in the form of egg-nogs and milk-punches. In the adynamic form other stimulants and tonics besides alcohol are often of great service. Ammonia, nux vomica, and quinine are indicated. If the nervous symptoms are prominent, accompanied by marked excitement and an elevated temperature, as in the ataxic type, these remedies are of little or no value, and may often do harm. If a condition, not of depression but of exhaustion, is present, nothing produces better results than the administration of musk in full doses. Constipation is the rule in this fever. This symptom, as well as the marked meteorism accompanying it, are combated chiefly by saline purgatives, preferably the sulphate of magnesia, or by mechanical means. Calomel in fractional doses is sometimes employed for this purpose; cold-water enemata or glycerin suppositories are of use. Intestinal antiseptics are important; salol by the mouth and by the rectum is used, provided the kidneys are in good condition; also permanganate of potassium by rectal injection. Epistaxis is controlled by cold applications to the forehead. The catarrh of the stomach, a troublesome symptom at the commencement of the disease, is best treated by ipecac, other emetics being avoided, and food can be administered by the rectum. The severe headache, the delirium, and the insomnia are relieved by opiates, and particularly by the use of chloral. Hyoscine is sometimes used with good effect, especially in violent delirium. If the insomnia is without headache it may be relieved by valerian or camphor. The fever may be controlled by quinine if it occurs in exacerbations, as in malarial regions, or tepid baths cooled down to the required degree. In marked prostration, and when collapse is imminent, strychnine has been used with benefit.—*Medical Review*, 1893, No. 21, p. 403.

THE TREATMENT OF DISEASE WITHOUT ALCOHOL.

DR. B. W. RICHARDSON, after an interval of a quarter of a century, returned to hospital practice at the London Temperance Hospital, taking charge of twenty-five beds. He reports his first two hundred cases occurring between April and October, 1892. His mortality was 14.50 per cent., against 11.60 per cent. on the medical side for the whole year of 1892, which he explains by the fact of the admission of all urgent medical cases and of many patients *in extremis*. The cases are far too briefly reported to indicate their severity, although in variety nothing more could be desired. Glycerin was used for making what might be called tinctures; various waters—aqua ferri, chloroformi, opii, quiniæ—were introduced; oxygen gas was used as a medium for carrying other volatile substances that admit of being inhaled with it—ether, ozonic ether, ammonia, amylene, amyl nitrite. He is satisfied that no aid which he could have derived from alcoholic stimulants, as they are called, could have bettered his results. He has acted on the principle of doing unto others as he would they should to him, and feels sure any candid medical brother who will have the steady courage to put aside many old and unproven, though much-practised methods, based only on unquestioning and unquestioned experience, and to move into these new fields of observation

and experience, will, in the end, find no fault with him for leaving a track which, though it be beaten very firmly and be very wide and smooth to traverse, may not, after all, be the surest and soundest path to the golden gate of cure.—*The Asclepiad*, 1893, No. 37, p. 1.

[The cases are too imperfectly reported and are too few in number to permit of any valuable conclusions. It is quite possible to conduct a hospital practice without resorting to any one of several commonly used drugs, as mercury, opium, digitalis, the iodides, quinine; but that fact would not prove that such practice was either advisable or proper. It is doubtless true that hospital physicians are likely to prescribe alcohol too frequently and with too free an hand; but abuse of a remedy is not an argument for its disuse and the deprivation of the unfortunate poor of a means that may tend to their relief. R. W. W.]

THE USE OF [MONO-] BROMIDE OF CAMPHOR IN VERTIGINOUS EPILEPSY.

DR. BOURNEVILLE has used this remedy for twenty years in the treatment of epilepsy when vertigo is a frequent complication. Five cases are reported showing the results of administration. The daily dosage is from three to seven capsules, each containing three grains of the remedy. Each week the daily dose is increased by one capsule until the maximum is reached, when the treatment is omitted for a week, to be resumed in the form of a daily dose of three capsules.—*Le Progrès Médical*, 1893, No. 18, p. 339.

THE TREATMENT OF CHLOROSIS BY IRON AND SOME OTHER DRUGS.

DR. RALPH STOCKMAN discusses the absorption, the stimulation, and Bunge's theory. He finds that there is overwhelming evidence that iron, when administered subcutaneously, will cure some forms of anæmia without even having had the opportunity of stimulating the alimentary canal or of neutralizing any possible sulphuretted hydrogen in the bowel. If given by this method, it is stored up in the liver chiefly, from which it is slowly excreted into the blood—probably in some organic combination—and no doubt thus subserves the gradual necessities of the organism. The dose is, however, small—one-half grain or less—and recovery is probably more rapid on larger doses given by the mouth. There may be some risk of irritating the kidneys, and no preparation thoroughly satisfactory for hypodermatic use has yet been proposed, and thus its exact value is somewhat difficult to gauge. Sulphide of iron, when administered to two patients, was followed by rapid recovery. In cases treated by the oxide, subnitrate, and salicylate of bismuth no improvement was observed in the condition of the blood until iron was substituted, when recovery took place rapidly. These three series of experiments are strong arguments against the theory of Bunge, that iron is only valuable so far as it absorbs sulphuretted hydrogen from the intestine. Arsenic has been used in chlorosis for many years, but the cases quoted show no reason to suppose that either the red corpuscles or the hæmoglobin are increased by its administration. If given with iron, it may be of benefit in so far as it acts as a gastro-intestinal tonic, improving the appetite and digestion, thus indirectly aiding in the cure. Also, by diminishing the demand of the tissues for oxygen, it may decrease the breathlessness of the

patient and thus add to her comfort. Manganese has a certain reputation as a hæmatinic, but in cases treated with the bin oxide and sulphate, only the slightest improvement resulted. Hydrochloric acid may improve the digestion, but certainly not the blood condition. Purgatives, of themselves, do not cause improvement until iron is added, and the same is true of purely dietetic treatment, either alone or combined with out-door exercise or rest in bed.—*British Medical Journal*, 1893, Nos. 1687, p. 881; 1688, p. 942.

THE HYDERABAD CHLOROFORM COMMISSIONS.

DR. PATRICK HEHIR has carefully reviewed their work. The first Commission showed that the keystone to the safe administration of chloroform in man and in most of the lower animals is formed by the two principles enunciated in the following terms—(1) With regard to the heart: "The Commission consider that it is impossible for chloroform vapor to kill a dog by acting directly on the heart, and this holds good no matter in what doses or in what manner the anæsthesia is induced. Death from primary cardiac failure never took place. (2) Regarding the importance of watching the respiration: So long as the respiratory mechanism remains uninterrupted, chloroform anæsthesia is perfectly safe, but should the respiration be impeded and the elimination of chloroform be thereby interfered with, danger at once arises; in other words, if respiration be kept regular, no danger can arise." The essential object in view was to show that the principles upon which Syme administered chloroform were sound and reliable. Free admixture of air with the vapor of chloroform, which is insured by using some soft, porous material (as a towel or lint) presenting a large surface; no stint in the quantity of chloroform given; and watching the respiration. He considered that there was never any occasion to feel the pulse or examine the heart, either before or during anæsthesia. The second Commission brought out the practical points that (a) primary cardiac syncope during chloroformization does not occur; and (b) the maintenance of regularity of the respiration is absolutely indispensable to the safe administration of chloroform. By keeping the respiration regular the force of blood-pressure is kept regular also, as is likewise the action of the heart and the circulation generally. Under these circumstances it would be impossible to administer chloroform in poisonous doses unless it were continued after the occurrence of complete anæsthesia. A grand rule to follow in practice is to remove the chloroform and allow the patient to breathe fresh air for a second or two when at all in doubt.—*Medical Chronicle*, 1893, No. 1, p. 22, and No. 2, p. 73; and *Indian Medical Gazette*, 1893, No. 4, p. 103.

[This contribution is a most carefully written argument for the accuracy of the results obtained by these Commissions, and the practical points are worthy of the consideration of all who practise chloroform anæsthesia.—R. W. W.]

THE TREATMENT OF PRIMARY SCIATICA BY ACUPUNCTURE.

DR. E. VALENTINE GIBSON reports that of one hundred consecutive cases treated by acupuncture, fifty-six were cured; thirty-two were much improved; ten were improved; while in two cases there was no improvement.

This is considered to be a very satisfactory result, considering the chronic nature and the severity of the cases. In addition to the acupuncture, they all used the Buxton thermal water, which has a great reputation for the absorption of inflammatory products. The needle should be single, spear-pointed and about two and one-half inches long. It should be inserted directly into the nerve, which will be known by the pain which shoots down the leg. The needle should be immediately withdrawn, as no better results are obtained if they are left *in situ*, and additional pain is likely to be caused. The nerve should be pierced about five times at intervals of a few days, over the parts where there is pain on pressure. Rest is necessarily most essential, as it is in other inflammatory conditions, and a rheumatic or gouty diathesis should be treated by appropriate remedies.—*Lancet*, 1893, No. 3633, p. 860.

SALOPHEN.

DR. KARL OSSWALD believes that in this remedy, which is a salol in which the poisonous phenol group is replaced by a harmless one—acetylparaamidophenol—we have a substance which will present all of the advantages, with none of the disadvantages, of the salicylic acid preparations. As decomposition takes place in the small intestine, and as it is with difficulty soluble in cold water and is nearly tasteless, it does not destroy the appetite nor interfere with digestion. In small doses it is nearly entirely excreted by the urine; in larger doses, the excess is found in the feces. It does not cause untoward symptoms, even in a daily dosage of two drachms. It is less effective in the same dose than salicylate of soda, because it contains less salicylic acid. It can be used with advantage in mild cases of articular rheumatism, or as a substitute for the salicylate of soda when the latter drug is not well borne. In patients who present an idiosyncrasy against the salicylate of soda, and especially in debilitated individuals, or who suffer from sensitive stomachs, this drug can be used with advantage. It is useful in neuralgias of all kinds, especially in cephalalgias or hemicranias, in connection with chlorosis and anæmia.—*Deutsche medicinische Wochenschrift*, 1893, No. 16, S. 366.

ANTIPYRINE IN DISEASES OF THE URINARY ORGANS.

DR. J. H. BRIK has found that this drug is a weak antiseptic, as is boric acid, and that it does not directly influence the reaction of the urine, but indirectly, through the nervous system, may render an alkaline or neutral urine acid. It is a useful analgesic in the purely nervous form of nephralgia and in the painful diseases of the pelvis and ureters, as inflammations and foreign bodies, etc. It is useful in the motor and sensory neuroses of the bladder, neck of the bladder and prostate, but it is of slight effect in inflammations, new growths, and tuberculosis of these parts. The hyperæsthesias and neuralgias of the urethra can be relieved by this drug. The best results are, however, obtained when the prostate or the prostatic urethra are involved. The property which this remedy possesses, similar to that of morphine, of acting upon unstriated muscular fibre, gives its field of usefulness in diseases of the urinary organs. It can be administered by the mouth or hypodermati-

cally, and in this way it is excreted by the kidneys, or by rectal injection or locally by injection into the bladder. If administered at night it is likely to relieve pain and produce rest. If ten to twenty drops of a 5 to 20 per cent. solution are injected into the prostatic urethra, a quite severe burning is apt to follow, which soon passes away, and is replaced by analgesia. This effect may last ten to twelve hours.—*Therapeutische Blätter*, 1893, No. 4, S. 97.

THE TREATMENT OF GONORRHOEA IN WOMEN.

DR. BRÖSE treats acute cases by douches of chloride of zinc or sublimate, the urethra receiving 1 to 5 per cent. solutions of nitrate of silver by injection. In local treatment the cervix demands attention, and the application of strong solutions of chloride of zinc (to 50 per cent.) has been followed by the best results, although the practice is not without danger. Intra-uterine applications are likely to be followed by salpingitis and pelvic peritonitis, and are rarely necessary. Relatively dangerous is the washing out and injection of the uterine cavity with remedies designed to disinfect it; a harmless and proper method is the application of caustic remedies upon a sound wrapped with cotton, or in the form of pencils; or the method of Fritsch may be employed—mechanical dilatation of the uterus and packing the cavity with strips of gauze wet with 2 per cent. solution of nitrate of silver, repeated daily for two weeks. The chronic urethritis is treated through the endoscope by a 5 to 20 per cent. solution of nitrate of silver.—*Deutsche med. Wochenschrift*, 1893, No. 18, S. 419.

MERCURIAL INUNCTIONS AND SULPHUR BATHS IN THE TREATMENT OF SYPHILIS.

DR. JOSEF DYMNECKI presents an argument for the combined use of mercurial inunction and sulphur baths for patients suffering from long-standing syphilis. Although it is argued that the combination of mercury with sulphur is an insoluble one, yet the experience of the writer in treating thousands of cases at the sulphur springs of Busko since 1859 proves that this insolubility of the compound has no unfortunate influence upon the process of cure. The increased tissue change which goes on under the action of the sulphur baths apparently affords the mercury better opportunity to come in contact with the syphilitic poison in the various organs, and thus this combination is favorable for a speedy cure.—*Internationale klinische Rundschau*, 1893, No. 18, S. 671.

THE ANTISEPTIC VALUE OF PHENOCOLL HYDROCHLORIDE.

DR. CARL BECK presents a preliminary communication, giving the results of his experiments with—*a*, the pure powder; *b*, 5 per cent. watery solution; *c*, 10 and 15 per cent. alcoholic solution; *d*, 10 and 20 per cent. gauze; *e*, 10 and 20 per cent. ointment. The pure powder does not irritate, and the healing process does not differ from that observed under iodoform. Repeated examinations of the urine revealed nothing abnormal. The 5 per cent. watery solution was successful in dermatitis, erysipelas, gonorrhœa, leucorrhœa. The 10 per cent. alcoholic solution was injected into the joints of hip

and ankle without irritation, but the final result was doubtful. The injection of a watery, and especially of an alcoholic solution, was always followed by a slight, transitory burning sensation. The 20 per cent. ointment (preferably made with lanolin) was used for an ulcer of the leg and for burns of the second degree. The granulations were of good character, but the healing process seemed to take longer than it did under the use of the gauze. This remedy is probably as valuable an antiseptic as iodoform, and is stronger than dermatol, aristol, iodol, pyoktanin, or euophen. It probably surpasses iodoform, because—1, it is odorless; 2, it dissolves easily; 3, it does not produce eczema; 4, it is not contra-indicated in kidney disease; 5, on account of its non-poisonous effects it can be applied to very extended surfaces. As a very small amount of the drug fulfils its purpose, the expense is small.—*New York Medical Journal*, 1893, vol. lvii., p. 438; *Notes on New Remedies*, 1893, No. 11, p. 177.

The following papers are worthy of notice:

"The Treatment of Malaria," by Dr. M. T. Schuuret, in the *Wiener medizinische Presse*, 1893, No. 13, p. 492, and No. 14, p. 535. A very careful review of the recent literature of quinine, phenocoll, methylene blue, helianthus annuus [sunflower], nitrates of soda or potash, alum, and hydrotherapy.

"Neurology and Therapeutics," by Dr. William R. Gowers, in the *British Medical Journal*, 1893, No. 1685, p. 781; No. 1686, p. 833; and the *Lancet*, 1893, No. 3633, p. 849.

MEDICINE.

UNDER THE CHARGE OF

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HEREDITARY ENLARGEMENT OF SPLEEN.

WILSON made a further communication to the Clinical Society of London (April, 1893) on some cases of hereditary enlargement of the spleen. The previous communication was in 1890. The possible malarial origin was finally abandoned. While, as regards the hereditary element, the cases were unique, they resembled in many important particulars some of the cases described under the term "splenic anæmia," "primitive splenomegaly," etc. All the cases in this series had occurred in adults, had run a more or less protracted course, and presented the following clinical characters: (1) Enlargement of

the spleen without any corresponding enlargement of the glands; and (2) marked globular anæmia without leucocytosis. In some of the cases there had been fits of epistaxis, and in others febrile attacks, accompanied apparently by active destruction of the red blood-corpuscles. It was suggested that, for temporary purposes at least, the series might be usefully regarded as a single group, and that the name "chronic splenic cachexia" appeared the most suitable under which to describe cases possessing these characteristics.

RAPID PLEURAL EFFUSION.

WHITE (London) relates the following case (*Lancet*, 1893, No. 3630):

The patient had ordinary tubal nephritis together with mitral constriction and regurgitation. On December 16th, 36 ounces of fluid were withdrawn from the right chest. Next day there was excruciating pain in this region and 106 ounces were withdrawn (thirty hours after the first tapping). Seventy-eight hours later 120 ounces were removed from the same side. On this occasion there was again intense pain and dyspnoea and great œdema of the neck, probably due to the pressure on the superior vena cava. Thirty hours later 50 ounces were removed.

"It seems to me that the only possible explanation of this extraordinarily rapid accumulation of fluid is that the patient had thrombosis of her large azygos vein before it is joined by that from the left side. It is not against this view that we saw no enlarged superficial veins, for the most important anastomoses between the branches of the azygos veins of the two sides and the large azygos vein and the inferior vena cava are deep-seated in the abdomen, the thorax, and around the spine. Nor is it conclusively against this supposition that no evidence of thrombosis was found post-mortem, for the patient did not die till eight weeks afterward, by which time all signs of thrombosis might very well have disappeared. She had the clinical symptoms of thrombosis of her femoral vein only ten days before her death, and yet the vein was at the necropsy found to be patent. I have often observed that when patients have died no evidence has been forthcoming of thrombosis although all the signs of it have been present during life. It seems to me that no other explanation offers itself of this case, in which, supposing the fluid collected at a uniform rate, after the first tapping of the right chest that rate was three ounces and a half per hour, after the second one ounce and a half per hour, and after the third about one ounce and a half per hour. It is also quite exceptional for the distention of the chest with fluid to be so rapid as to cause acute pain, and it is no doubt comparable to the severe pain in the calf, felt in acute femoral thrombosis, and, like it, is probably due to the rapid stretching of the parts by the fluid; also it must be very rare for the pressure of the fluid in the superior vena cava to cause œdema of the neck."

VESICULAR ERUPTION ON THE PALATE: A SIGN OF INFLUENZA (?).

SHELLY draws attention (*Brit. Med. Journ.*, 1893, No. 1685) to a peculiar appearance of the soft palate. When examined in a good light it was found to be more or less completely studded with minute, translucent, lenticular

elevations, somewhat resembling tiny, well-boiled grains of sago. The size was usually 0.5 mm., never exceeding 1 mm. in diameter.

"These vesicles were most abundant about the soft palate above the root of the uvula; but in some cases—and these were generally of the more severe type—they occupied a much larger area, being visible over the greater part of the roof of the mouth, but being always most marked and most abundant in the situation first mentioned. The patient was quite unconscious of and apparently unaffected by their existence.

"I was, of course, aware that the condition described is to be observed in cases other than those of influenza; nor do I yet venture to suggest that it is pathognomonic of that disease. No one can examine the throats of a large number of persons without occasionally observing the presence of these vesicles, to some extent at all events; but in connection with no other malady had I noticed them to be, not merely so frequently, but constantly, present, and this from the earliest period of the illness and throughout convalescence."

In the summer of 1891 abundant vesicles were noted in the case of every boy admitted to the Sick House at Haileybury College. Whenever, during that epidemic, vesicles were observed in boys who reported themselves on account of trivial injuries or other ailments, they were immediately sent to bed, and in one only out of forty did indubitable symptoms of influenza fail to develop within twenty hours. Of seventeen boys who—though complaining of malaise and exhibiting some pyrexia—did not present any abnormality of the palate, five only subsequently developed influenza.

These vesicles appear in all forms of the malady, but perhaps more conspicuously in the cases in which the respiratory passages are especially implicated. They persist throughout convalescence.

RAW PANCREAS IN THE TREATMENT OF DIABETES.

WHITE (London) records the following results (*Brit. Med. Journ.*, 1893, No. 1679). Two cases were submitted to treatment. Each patient was for the whole period of observation kept upon a diet consisting each day of twenty Soya-bean biscuits, two eggs, two ounces of butter, two almond biscuits, one fluidounce of milk, twelve ounces of cooked meat, greens, watercress, tea, and soda-water. The state of the patients and of the urine on this diet having been ascertained, each was given in addition, for his supper, about two ounces of raw fresh sheep's pancreas chopped fine and flavored with pepper and salt. When this was discontinued five minims of liquor pancreaticus were injected subcutaneously night and morning, the restricted diet being as before.

As regards the sugar, in one case it was distinctly less when raw pancreas was taken than it was before, and the same effect, but to a less degree, was associated with the injection of liquor pancreaticus subcutaneously. In the second case, neither of these methods had any effect in reducing the sugar.

Quantity of urine. No decided effect observed, nor was the specific gravity appreciably affected.

Urea. No effect was produced on this in Case 1. Possibly an increase was due to the treatment in Case 2.

General effects. The patients liked the raw pancreas. They did not lose weight on it; if anything, there was a slight improvement in their condition.

Disadvantages. In one case severe erythema with fever; in the other, sore-throat with rise of temperature.

White thinks it very doubtful whether any benefit is to be expected from this treatment of diabetes mellitus.

HEREDITARY (FRIEDREICH'S) ATAXIA.

SENATOR (*Berliner klin. Wochenschr.*, 1893, No. 21) has reported a case of hereditary (Friedreich's) ataxia in a male, nineteen years old. Awkwardness of gait had been observed during childhood, and had grown progressively worse. Intelligence was preserved; static ataxia was marked; the gait was unsteady; the knee-jerks were enfeebled and inconstant, even with reinforcement. Vertigo was complained of. Sensibility was normal, and there was no distinctive trophic change. There was a slight degree of horizontal nystagmus, but no other ocular symptom. The tongue occasionally presented slight fibrillary contractions. Speech was slow, drawling, and impeded, somewhat monotonous, but not scanning. The function of the sphincters was not deranged. A sister of the patient, thirty-two years old, had also presented similar symptoms from childhood. Senator does not agree with the view that ascribes the pathology of hereditary (Friedreich's) ataxia to combined sclerosis of the posterior and lateral columns of the spinal cord. He believes that the primary lesion is a congenital defect in the development of the cerebellum or of physiologically related parts in the medulla oblongata, and points out the close similarity between the symptoms of hereditary (Friedreich's) ataxia and those of cerebellar disease.

A CASE OF PULMONARY SYPHILIS.

JULLIEN (*Annales de Dermatologie et de Syphilographie*, tome iv., No. 4, p. 45) has reported the case of a woman, forty-six years old, who presented herself with ulceration and tumefaction of the right leg, that had existed for a year, and was painful and impeded the gait. The appearances were those typical of syphilis; besides, the tibia was found to be swollen. The woman had borne three healthy children by a first husband; her second husband was also dead, and had probably been syphilitic. The woman was greatly emaciated, extremely pale, and presented a cachectic appearance. For several months she had had constant fever, with vesperal exacerbations and night-sweats. The breathing was difficult, shallow, and rapid; cough was almost incessant. The expectoration was copious and muco-purulent. On physical examination, irregularly distributed areas of impaired pulmonary percussion-resonance were found, of greater extent and degree upon the left, with harsh breathing and fine and coarse moist and dry râles—in a word, the signs of infiltration and softening in various parts of the lungs. Careful and repeated examination of the sputum failed, however, to detect the presence of tubercle bacilli. Numerous animals inoculated with the sputum died of septic abscess formation, but none of tuberculosis. The woman was, besides, a pronounced dyspeptic, with marked gastrectasia. She was placed upon general tonic and constructive treatment, given potassium iodide by enema in milk, and subcutaneous injections of calomel. The improvement was so decided in the

course of seven months that, notwithstanding admonition to the contrary, the woman withdrew from treatment. Her condition again became worse, but on resuming treatment pronounced improvement again took place. The results of physical examination now indicated retrogressive changes in the lungs. The woman, however, again became worse, anæmia and emaciation becoming marked, and hæmoptysis being so profuse as to threaten life. A course of injections, according to the method of Brown-Séquard, was now instituted, with results that exceeded anticipations.

THE BACTERIOLOGIC DIAGNOSIS OF CHOLERA.

THE following is the mode of procedure carried out at the Institute for Infectious Diseases at Berlin, in a bacteriologic study of a suspected case of cholera (*Zeitschrift f. Hygiene u. Infectiouskrankh.*, 1893, Bd. xiv.; *Deutsche medicin. Wochenschrift*, 1893, No. 22, p. 523). Cover-glass preparations are first made (the flakes of mucus that are often present in the dejecta being selected) and stained with a dilute carbolized fuchsin solution. If comma bacilli be found, peptone cultures and gelatin plate-cultures are made. The peptone medium consists of a sterilized one per cent. watery solution of peptone and of sodium chloride, to which sufficient soda is added to impart a decided alkaline reaction. This is kept at a temperature of 37° C. If cholera bacilli are present in large number, a pure culture will be found on the surface of the peptone solution at the end of six hours; if present in smaller number, the culture will develop more slowly and there will be an admixture of other bacteria. It is best to look for the bacilli in from six to twelve hours after inoculation. If the peptone contain a certain proportion of nitrates, if the sulphuric acid employed be free from nitrous acid, and if the cultures be pure, the cholera-red (indol) reaction will take place. A good ten per cent. gelatin culture-medium is inoculated and kept at a temperature of 22° C. At the end of from fifteen to twenty hours characteristic appearances will have developed. If upon primary microscopic examination cholera bacilli have not been found, agar plates are cast in addition to the inoculation of the peptone solution and the gelatin plates. Six hours after the inoculation of the peptone solution curved bacilli are from time to time looked for; and as soon as found agar plates are cast. The material to be examined is preferably not mixed with liquefied agar; but the sterile agar is permitted to harden in covered dishes and placed for a few days in the thermostat to permit the expressed water to evaporate. The surface of the agar is then inoculated with the suspected material or from the peptone solution and kept at a temperature of 37° for eight or ten hours. If cholera bacilli be present they form colonies of light-yellow, transparent appearance. If few cholera bacilli have been found in the peptone solution and few or no colonies on the gelatin plates, suspicious or doubtful colonies upon the agar plates must be transferred to other agar plates, to peptone solution, and to gelatin plates, so that sufficient material may be obtained for the purposes of the indol reaction and of experiment upon animals. For this last purpose, cultures from the surface of agar plates are to be preferred. With a platinum loop, about 1.5 mg. of the culture are taken and mixed with 1 c.cm. of sterilized bouillon and injected into the peritoneal cavity of a guinea-pig. This

is lethal for a pig weighing from 300 to 350 grammes. The peptone solution may also be employed for the detection of cholera bacilli in water. To about 100 c.cm. of the suspected water are added one per cent. each of peptone and sodium chloride and the mixture is kept at a temperature of 37°. In ten, fifteen, and twenty hours agar plates are to be inoculated with this solution. The resulting colonies are further cultivated upon peptone, glycerin, and agar, studied for the indol reaction, and injected into lower animals.

TUBERCULOSIS OF THE BUCCAL CAVITY, WITH PERFORATION INTO THE NARES AND MAXILLARY ANTRUM.

RETHI (*Wiener medicin. Presse*, Jahrg. xxxiv., No. 19, p. 721) has reported the case of a man thirty-one years old, without history of syphilis and without hereditary predisposition, who for eight years presented cough, with mucous expectoration, at times blood-streaked. In 1888 there appeared pain in the throat, particularly upon swallowing, together with hoarseness and cough. Some improvement in these symptoms took place, but they returned in the course of the following year. Examination now disclosed the evidences of a tuberculous process at the apex of the left lung and in the larynx. Matters grew gradually worse and in time the right lung also became tuberculous. The man's condition fluctuated for a couple of years, until, after the removal of a tooth and several roots, the opening left in the gum would not close and there resulted an ulcer, attended with considerable secretion. In the hope of effecting a cure other teeth were sacrificed and some fragments of bone were thrown off spontaneously. Little change took place in the process in the larynx, but that in the lungs steadily advanced. Histologic examination of a bit of tissue removed from the mouth in the neighborhood of the ulcerated area, disclosed the existence of a tuberculous process, round-celled infiltration, with epithelioid cells and giant cells, and in the midst of which a small number of tubercle bacilli were visible. The process advanced in spite of persistent treatment. Early in 1891, the left naris became occluded and soon afterward a communication was observed to have taken place between the mouth and the nares and the antrum of the upper jaw. Almost all of the upper teeth on the left side were gone, and the alveolar margin and the adjacent hard palate were destroyed. Difficulty in swallowing (fluids and solids entering the nares) and in speech rendered necessary the wearing of a plate of artificial teeth. Cauterization, curetting, applications of lactic acid, and other treatment proved of no avail. The glands behind the left sterno-mastoid muscle became enlarged and a cold abscess formed and had to be evacuated. The communication between the mouth and the nose finally extended from the left second molar tooth almost to the middle line, along the alveolar margin to the right second incisor and backward to the last molar, the roots of which were exposed. The under surface of the septum narium was exposed and the ulcerated, granular and purulent surface of the mucous membrane of the antrum was also to be seen. This condition of affairs continued until interrupted by the occurrence of death. It is an interesting question whether the tuberculous process in the mouth was secondary to the extraction of the tooth, or if such a process was the primary factor that led to the loosening of the tooth.

A REMARKABLE TRAUMATIC NEUROSIS.

PEL (*Berliner klinische Wochenschr.*, No. 24, p. 561) has reported the case of a man, twenty-seven years old, who fell a distance of two stories, possibly striking his head. Consciousness was lost and did not return for four hours, when severe headache appeared, referred particularly to the nape of the neck and the occipital region upon the left side. There was neither nausea nor vomiting, nor hemorrhage from the nose or ears, nor involuntary passage of urine or fecal matter. No external lesion could be discovered. The patient remained in bed for three days, complaining of left-sided occipital headache, vertigo, and drowsiness. Weakness of the right side of the body was also observed. Speech was not interfered with, but standing and walking were performed only with difficulty. On attempting to resume his occupation as a carpenter, after the lapse of four weeks, the man found himself unable to do so on account of headache, vertigo, and a sense of fatigue in the extremities, especially those of the right side. In the course of time vision became impaired and the other symptoms became aggravated, until, ten months after the accident, the patient was unable to stand or walk. In the recumbent posture, however, he had perfect control of the movements of the lower extremities, but as soon as an attempt was made to place him upon his feet the lower extremities would give way and the patient would fall unless supported. The knee-jerks were exaggerated. The face at the same time became red, and the skin covered with perspiration; the pulse increased in frequency, and the patient appeared as if exhausted. On examination a complete right-sided hemiparesis was found to exist. Common and special sensibility were normal, and there were no muscular or cutaneous trophic changes. The urine presented no abnormality. Upon laryngoscopic examination a polyp was found seated upon the anterior portion of the right vocal band, and which, upon phonation, became incarcerated between the two bands. A high degree of myopia existed, but there was neither choked disk, optic neuritis, limitation of the field of vision, nor disturbance of the color-sense. There was no neurotic or psychotic family history, and no personal history of alcoholic or venereal excesses. The diagnosis wavered for a time between functional derangement of the central nervous system—traumatic neurosis and organic disease of the cerebellum—tumor, cyst, abscess. It was determined to remove the polyp in the larynx, and immediately after the operation the man became aphonic. In the course of several weeks there developed right-sided hemianæsthesia, hemianalgesia, hemianosmia, hemiamblyopia, and bilateral loss of the sense of taste. A little later all doubt as to the diagnosis was removed by the occurrence of an hystero-epileptic attack, and some time later a second attack. In spite of assiduous treatment the condition of the man underwent little improvement. He was finally attacked with bilateral catarrhal pneumonia, to which he rather unexpectedly succumbed. A careful post-mortem examination failed to disclose any organic change to explain the symptoms present during life.

SURGERY.

UNDER THE CHARGE OF

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THE VALUE OF INTERNAL MEDICATION IN THE TREATMENT OF MALIGNANT DISEASE.

IN discussing the treatment of malignant disease by internal medication, WRIGHT (*Annals of Surgery*, April, 1893) does not uphold this method to the exclusion of surgical interference, but rather advises its use in preparation for and in conjunction with the most thorough extirpation by the knife. For the purpose of destroying outlying foci of disease left by the knife, he tried various drugs internally, and in cases that he had operated upon, as well as in those in which operation was impossible, he began to give the bromide of arsenic in one-fortieth to one-tenth grain doses after meals, and the carbonate of lime before meals in five to ten-grain doses in the tincture of calumba. In many cases coming under the head of sarcoma, there was quite a rapid tendency toward cure, and this was generally permanent. Large deposits, as a rule, would not yield, but excision of the enlargement was often followed by a sure cure. As to cases affecting bone, osteo-sarcoma, the treatment was not so favorable, but seemed of some value. He advises practitioners to give the bromide of arsenic to all patients as soon as they come under their care, and continue the remedy for a long time after operation. In a considerable number of cases operated upon for cancer in the past three, four, and five years, to whom the bromide of arsenic was administered for a time, say six or twelve months, complete health has been restored and the scar tissue is now in every way just as normal as it would be if the wound had been in perfectly healthy tissue. In no case did the microscopic examination fail to confirm the diagnosis. The same results might possibly have been obtained by complete and thorough operation, and yet he believes there is value in the after-treatment, and that a case would be neglected without it. In inoperable cases he has seen good results, not the removal of the growth, but relief of pain and a retardation of the growth. In some cases of cancer of the intestines he has seen the bromide of arsenic bring relief and prolongation of life.

THE USE AND PLACE OF CAUSTICS IN THE TREATMENT OF CANCER.

LEWIS (*Annals of Surgery*, 1893), in discussing the use of caustics, agrees with the principle of Walshe, who said: "Escharotic agents should be

applied in such a manner as to produce the requisite effect, if possible, by a single application, otherwise the irritation gives, not necessarily but commonly, new activity to the disease." The dangers of mild cauterization are only too frequently seen. Caustics in operable cases, as cancer of the breast, should never be preferred to the knife. Caustics should not be used in cases involving any mucous surface. In cutaneous cancer the author finds a field for the use of caustics. He says: "The disease can be thoroughly destroyed by caustic applications, which act sufficiently upon the diseased tissues without destroying the healthy skin." "The resulting cicatrix, when the deep subcutaneous tissues are not involved, is a smooth, white, and in every way healthy one, and far less conspicuous than those remaining after operation." The only exceptions he finds in cases involving the mucous surfaces of the lips or eyelids or a large surface. If the disease is a small, warty growth, he advises the use of Jennings' potash and cocaine paste. The formula is as follows:

R.—Hydrochlorate of cocaine	2 parts.
Caustic potash	12 "
Vaseline	6 "

Acetic acid must be at hand to limit its action as soon as desired. He has used in over one hundred cases a paste recommended by Marsden, composed of arsenous acid, two parts, and mucilage of acacia, one part, mixed into a paste too thick to run. It is not to be used in cancers more than four square inches in area, and is to be applied to only one square inch at a time. It should be covered with absorbent cotton to absorb superfluous paste, and left on till some swelling of inflammatory character appears around the border of the plaster, when it is removed. From one to three days are required to produce the desired effect; then warm poultices are applied to remove the slough, and a healthy ulcer follows, which heals rapidly. Bougard's paste, which is less painful, is used in a similar manner, but can be applied to a larger surface, and kept prepared in a covered jar. The skin surface must be removed with caustic potash in both cases. Bougard's formula is as follows:

R.—Wheat flour	60	grammes.
Starch	60	"
Arsenic	1	"
Cinnabar	5	"
Sal ammoniac	5	"
Corrosive sublimate	0.50	centigramme.
Solution of chloride of zinc at 52° F.	245	grammes.

THE DOMAIN OF THE KNIFE IN THE TREATMENT OF CARCINOMA.

JACOBSON (*Annals of Surgery*, 1893) believes that in the knife we have the only means of dealing with cancer, and to be effectual the operation must be extensive, thorough, and painstaking; all diseased tissues, and every suspected portion of tissue must be removed, and every lymphatic that communicates with the diseased area, whether infected or not. The present status of belief in this regard is not that such a radical removal is best, but that it must be done, and is indicated in every operation no matter how small the area of

infection may be. In breast operations the axilla must always be thoroughly cleared of all glands and fat; if the glands show evidence of infection, great care should be taken to remove all vestiges of the disease; the danger of leaving foci on the pectoral fascia is great, and all the fat should be carefully removed, while some authors go so far as to advise the removal of a layer of the pectoral muscles. Thorough removal is preferable to immediate union and complete coaptation. In cancer of the uterus the difficulties are greater and recurrences more frequent, but the more radical and complete the operation the greater are the patient's chances, provided an operative recovery is not endangered. Methods are still unperfected, but with improved technique in operating the author believes that the knife will remain in the future, as it is now, the best means of treatment at our command. Early diagnosis and operation are important factors in reducing the mortality. In conclusion the author says: "I may be permitted to reiterate that recent study of cancer only emphasizes its infectious character and primarily local origin. To effect its cure we must be able to reach beyond the infected area into healthy structure. To accomplish this with reasonable certainty the surgeon has but one agent—the knife."

A NEW INDICATION FOR PERINEAL URETHROSTOMY; EXTENSIVE DESTRUCTION OF THE URETHRA.

PONCET (*Gaz. hebdomadaire de Méd. et de Chir.*, 1893) reports a case of extensive laceration of the urethra in which he deemed it necessary to make a perineal section in order to drain the bladder and prevent urinary infiltration, infection, and consequent sloughing. The patient passed into his urethra a large cord, using a twisting motion in order to make it enter. This peculiar motion had the effect of tying a knot in the cord at a point either within the bladder or in the prostatic urethra. When the patient found himself unable to withdraw the cord he cut it off close to the glans, the end slipping back within the urethra. It remained in this position, the patient urinating around it, for two weeks, and seemingly produced no distress or pain until the end of that time, when the patient came into the hospital with an enlarged and inflamed organ. The cord was extracted with difficulty with urethral forceps, but the subsequent inflammation was so intense that a perineal urethrostomy was necessary. The patient recovered, but the urethra had been so effectually destroyed that it was impossible to re-establish its function.

A CASE OF PERINEAL LITHOTRITY.

BANGS (*Annals of Surgery*, 1893) reports a case in which he performed supra-pubic cystotomy, removing a stone weighing 400 grains, and two protruding portions of the lateral lobes of the prostate. Siphon drainage was employed in the usual manner. The patient recovered, but had little control over the bladder. Urination was painful, frequent, and complete evacuation was impossible except by the use of the catheter, and at his best he was compelled to urinate every two hours. This condition continued for two years; treatment by rest and washing out the bladder affording some relief. Finally, after an aggravated attack, a stone was found, and incrustations on

the anterior bladder wall. The author decided to perform perineal lithotripsy, or Dolbeau's operation. By means of a staff and the use of Dolbeau's dilator a canal of from one to one and a half inches was tunnelled through the perineum and prostate, the lithotrite introduced, and the stone crushed and removed. A drainage-tube was introduced, the wound packed with iodoform gauze, and siphon drainage maintained for four weeks, when the tube was removed, and the wound healed in eleven days. The expulsive power of the bladder was quickly regained, and the patient urinated standing. The interval varied from four to six hours, and at night seven to nine hours. The author believes the improved condition to be due to the great dilatation of the prostatic urethra.

THE RADICAL CURE OF HERNIA BY BONE PLATES.

THIRIAR (*Le Merc. Méd.*, 1893) describes a new method for performing this operation, which he has used successfully in twenty-five cases. It consists in the interposition of a decalcified bone plate, larger than the internal ring, between the abdominal parietes and the peritoneum which has been dissected up from the inner surface, around the stump of the previously ligated hernial sac. The bone plate is held in position by sutures that are so placed as to approximate the different layers of the abdominal wall. In the twenty-five cases which the author operated upon he has seen no relapses and no failures, and the cases upon which it has been tested have been the most unfavorable ones which have come under his care; in some cases relapse had occurred after other attempts at radical cure; in others the herniæ were very large, and the abdominal opening would admit three or four fingers, while the tissues were weak and relaxed. The part that the author ascribed to the bone plates is that of a structure upon which the leucocytes could build up a dense mass of connective tissue following gradually as the bone plate was absorbed. This he was able to prove by microscopical examinations of pieces that were thrown out of the wound unabsorbed. The production of this thick mass of cicatricial tissue produces a plug that does not yield to pressure. The bones used by the author were the shoulder-blade or any of the large bones of the beef or porker. They should be taken as the animal is killed, denuded of their periosteum, without injury to the bone substance, and plunged into a 10 per cent. solution of hydrochloric acid. The amount used should be ten times the volume of the bones, and should be renewed every two days. The action is more rapid if the bones are cut into small pieces; they are sufficiently decalcified when soft and pliable under water, without the production of bubbles. The marrow of long bones can be removed the second or third day. It is then placed in a 1 : 1000 bichloride solution for two days, and finally preserved in an ethereal solution of iodoform, but must be dehydrated in 95 per cent. alcohol previously.

LOOSE BODIES IN THE KNEE-JOINT.

RICHARDSON contributes (*Boston Medical and Surgical Journal*, 1893, No. 21) some valuable suggestions on this subject. As is well known, opening of the knee-joint has always been attended with considerable risk. Under Listerian methods this risk has been very much reduced, but it undoubtedly

still exists, as cases which have been operated on with the most careful attention to antiseptic detail have occasionally resulted in the destruction of the joint, and even in death from septicæmia. The annoyance caused by foreign bodies in the knee-joint is so considerable in many cases that operation seems demanded.

Attention to the following recommendations of the author will no doubt render this operation as free from danger as other surgical procedures of like magnitude. Every detail of asepsis is to be carefully carried out. It is advised to open the supra-patellar pouch external to and above the patella. If possible, the loose body is to be grasped between the thumb and forefinger of the left hand, and thus held while the incision is being made. Before opening the synovial membrane, all bleeding-points must be secured with pressure forceps. The hands of the operator and of his assistant should not come in contact with the wound. The cut surface is kept dry with *dry* sterilized gauze held in forceps. The flaps are kept retracted with vulsellum hooks. Having dried the wound, the synovial membrane is cut through, the foreign body grasped with forceps and withdrawn. Avoid digital exploration, and do not irrigate the joint, unless there has been a large effusion present.

The author prefers to close the wound with silver wire armed with a needle at either end, so that the punctures through the skin may be from within out. The wound is sealed with iodoform collodion; a posterior splint and antiseptic gauze and cotton are applied with gentle pressure.

Four cases are reported in which the result of the operation was satisfactory.

SEPARATION OF THE LOWER FEMORAL EPIPHYSIS.

MAYO ROBSON reports (*Annals of Surgery*, 1893, No. 1) three cases of this accident coming under his care. Attention is called to the fallacy of considering these injuries as equivalent to transverse fractures of the lower end of the shaft of the femur, and of treating them as such, as is recommended in most text-books.

In two of the cases reported the separated epiphysis was dislocated forward, the lower end of the diaphysis projecting in the popliteal space; the affected limb was shortened. In the third case the separation was incomplete. The deformity in this case was but slight, save the swelling of the joint, and the affected limb was somewhat longer than its fellow, measured from the anterior superior spine of the ilium to the lower border of the patella. In three other cases observed by the author the dislocation was forward in each instance.

Reduction is to be accomplished, under anæsthesia, by extension, counter-extension, and manipulating the epiphysis into position. For retention, the posterior splint, the double inclined plane, or the long splint, with weight and pulley, may be employed. †

In the cases recorded a perfect recovery took place in every instance, without any impairment of function.

Nearly all of the reported cases have been caused by direct violence. The direction of the displacement will be determined, at least in part, by the direction in which the violence has been applied, and also upon the attach-

ment, or otherwise, of the gastrocnemius tendon to the lower end of the upper fragment.

The diagnosis in most cases is not difficult. Shortening of from one to two inches, the projection of the lower end of the diaphysis in the popliteal space, the displacement of the epiphysis on the front of the femur, and the interference with the circulation of the leg, when taken together with the cause of the injury and the age of the patient, form, according to the author, a group of symptoms pathognomonic of the injury under consideration.

If reduction is impossible, excision may be resorted to; while, if the great vessels have been ruptured, or gangrene has occurred, amputation must be performed.

IODOFORM IN THE TREATMENT OF TUBERCULOSIS OF BONES AND JOINTS.

BRODNITZ claimed (*Deutsche Zeitschr. f. Chirurgie*, Bd. xxxv., Hefte 5 u. 6) that the results of operative treatment of bone and joint tuberculosis have considerably improved since the employment of iodoform has been practised. KÖNIG explains this by assuming that tuberculosis cannot develop in quickly contracting scar tissue. Mosetig v. Moorhof attributes a specific effect to the iodoform.

For the past three years the author has used iodoform, as recommended by Billroth, which consists of a sterilized 10 per cent. mixture with glycerin. The absolute sterilization of the mixture is of the utmost importance.

The author reports 20 cases of cold abscess subjected to this treatment. Of these 9 were cured, 8 had fistulæ remaining, and 3 were unheard from. Of 25 cases of bone tuberculosis operated upon, and the iodoform-glycerin mixture employed in addition, 20 were discharged cured. Nine cases of capsular tuberculosis were subjected to arthrectomy and the use of iodoform, and 7 were definitely cured.

DE VOS has written an exhaustive monograph on this subject (*Centralblatt für Chirurgie*, 1893, No. 3). He prefers the iodoform mixed with olive oil, and carefully sterilized. It is used in exactly the same manner as the iodoform-glycerin mixture.

Seventy-two cases are reported, which have been subjected to this treatment; 72 per cent. of these are said to be entirely cured. The duration of the treatment in the different cases was from 9 to 325 days. The number of injections ranged from one to twenty. The amount of iodoform used was from 2 to 67.5 grammes, and of oil, 10 to 385 grammes.

Improvement is shown, after beginning this treatment, by decrease of the pain and of the swelling; and new connective tissue results at the seat of the injections. This latter is said to have been observed in a patient whose knee-joint was resected after having undergone the iodoform treatment.

OBSTETRICS.

 UNDER THE CHARGE OF

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 SYMPHYSIOTOMY.

SWIECICKI (Posen) reports (*Centralblatt f. Gynäkologie*, 1893, No. 23) a case aged twenty-one years, I-para, with a flat and generally contracted pelvis; conj. vera, $7\frac{3}{4}$ cm. Symphysiotomy; child delivered with forceps; recovery after four weeks.

NEUGEBAUER, in 196 new operations for symphysiotomy, from 1827 to 1893, found that there were 23 deaths. Of these, 4 were from causes not connected with the operation, and in 19 cases the death was in relation with operation.

SCHAUTA believed that more symphysiotomies were prepared for than were done, the birth ending by the application of the forceps. The wounding of the soft parts came not through the transverse but by the longitudinal stretching of the head. He holds the hand to be the best means of protecting the soft parts.

ZWEIFEL regards symphysiotomy as an acquisition to surgery, and considers that it will become of much more importance than Cæsarean section in the universal practice of the surgeon. By waiting for spontaneous birth after the operation we avoid the wounding of the soft parts and of the child by the forceps.

He mentions two cases; one with the conjugate of $8\frac{1}{2}$ cm. He believes the bad after-history to be often due to bad, defective adaptation and no sewing of the joint. He has always drained the wound. The forceps should always be first tried.

KEIN (*Gaz. de Gyn.*, 1893, No. 16) reports a case of symphysiotomy in a multipara during the third day of labor. Pelvis narrowed by fibroids of sacrum and pubis. Conj. diam, $6\frac{1}{2}$ cm.; conj. ext., 18 cm.; vaginal secretion purulent. After division the pubic bones separated $\frac{3}{4}$ cm., and a living child was easily extracted with the forceps, the bones separating to 7 cm. during traction. Hemorrhage slight. Woman made a good recovery, although two abscesses formed at ends of incision.

V. COCQ (*Journal de Medicine, de Chirurgie, et de Pharmacologie*, 1893, vol. ii., p. 97) gives his conclusions on the operation of symphysiotomy, as follows: Mousan puts the pubic separation at 7 cm.; Pinard at 6 cm. For each centi-

metre of separation the pubo-promontory measure increases on an average $2\frac{1}{2}$ mm. The maximum separation at section with safety to the sacro-iliac joint is about 6 cm., the increase of the sacro-pubic line will then attain about 13 to 15 mm. He further concludes:

1. It is easily performed, and requires only the usual surgical outfit.
2. It is an operation of urgency that everyone should be able and ready to perform—like tracheotomy.
3. The operation is legitimate only with strict antisepsis.
4. A pubic separation of 6 cm. is without danger and equals 22 mm. antero-posterior diameter.
5. It is advantageous to mother and child, and the mortality is small.
6. After forceps and version have been tried, operate if child be living, and the superior conjugate diameter be 6.7 cm.
7. Before term, have recourse to operation in pelvis between 4.5 and 6.7 cm. in antero-posterior diameter, the labor being artificial and premature, as by compression the bi-parietal can be made 6.5 cm. Formerly in such cases abortion was the only recourse.
8. Embryotomy is not legitimate if fœtus be living and the woman at term, unless pelvis be below 6.7 cm.
9. Cæsarean section should not be practised in contracted pelvis unless below 4 cm., except in place of embryotomy.
10. If consulted before term, and pelvis is under 8 cm., use premature labor and select that month of pregnancy which corresponds to the length of the bi-parietal diameter of the infant.
11. In oblique ovate pelvis ischio-pubiotomy is preferable to symphysiotomy.

LE PAGE (*Archiv. Tocol. et Gynécol.*, 1893, vol. xx., No. 5), at a meeting of the Société Obstétrique de France, April 7, 1893, presented notes of a case of symphysiotomy in a II-para for a pelvic tumor. Operation performed at the moment of dilatation with no especial difficulty, and a living child extracted. Labor went on normally after operation; forceps were used to deliver. Both mother and child made a good recovery. He formulates the following conclusions:

1. Symphysiotomy is an operation of urgency, practicable outside of maternities.
2. It is not merely of use in contracted pelvis, but in normal ones if the fœtus be very large, or if pelvis is obstructed by tumors.
3. In the case reported, a premature labor at eight and a half months would have been insufficient. He thinks an accurate diagnosis should be made by touch before operating. The statistics of four other cases were presented for contracted pelvis. All the mothers did well. Three of the children lived; one died during birth.

M. BUDIN reported a case where the above operation was done for a rachitic pelvis. Promonto-subpubic diameter 9 cm., accompanied by general contraction of pelvis. Patient was a I-para and long in labor. Forceps had previously been tried. After operation the child was extracted, apparently dead, but was resuscitated and died eleven days after. Mother recovered.

TELLIER (*ibid.*) reports a case, I-para, with pelvis of $10\frac{3}{4}$ cm. promonto-subpubic diameter; pelvis *canaliculate*. When symphysis was cut there was

severe hemorrhage from branch of descending pubic artery (which, in this case, was as large as the radial), which caused much trouble. A living child was extracted with forceps; the symphysis separated 10 cm.; extensive tear of perineum and vagina anteriorly. The mother died from hemorrhage and shock. Autopsy showed nothing beyond the tears.

VARNIER discussed the application of the forceps at the superior strait in contracted pelves and its relation to symphysiotomy. Those of the school of Pinard maintained that without prior section of pubes this should not be done, as it involved the greatest dangers to the child and much to the mother. The section should be complete and include the subpubic ligament, and that the pelvis be dilated before final intervention.

BAR considered that version and moulding of the head should be tried in such cases. The value of induced premature labor was also pressed.

PUECH (*Nouveau Montpellier Medical*, 1893, p. 433), after a record of the history of symphysiotomy, states that it is owing chiefly to strict antisepsis that the operation has been once more brought forward. The only instruments necessary to the successful performance are two bistouries, some hæmostats, and it is well also to have a chain saw at hand to divide the symphysis in case of ossification. Besides these, the physician needs also the ordinary forceps and agents commonly used to resuscitate an asphyxiated child. He recommends that the incision be made about 8 cm. in length, and should be from above downward and from before backward, following the line of least resistance. It is of importance to divide the subpubic ligament. Some operators advise incomplete section of the bones or leaving the ligament uncut. This the author does not consent to. A cautious abduction of the thighs shows a separation. This should not be less than 4 cm. or more than 7 cm. The expulsion of the child should not be left to Nature, but accomplished promptly by means of forceps. Out of 61 cases of symphysiotomy, 51 were delivered by forceps, 10 being by the feet. A provisional antiseptic dressing should be put in the wound before the application of the forceps. Douches should afterward be given until the water returns clear.

In regard to sutures, he recommends that three or four deep ones of silver wire should be inserted close to the anterior face of the pubes, followed by a few superficial ones. There is no need for bone sutures. The thighs should be approximated, and, if necessary, a plaster splint can be applied. Stitches should be removed on eighth day; patient should remain in bed until the twentieth day.

In rhachitic pelves measuring over 6 cm. antero-posterior diameter, the enlargement obtained is more than that furnished in the normal pelves by the same degree of separation. This stretching may reach 6 cm. without lesion of sacro-iliac articulations. Considering only the antero posterior diameter of the bony pelvic ring, one sees that for a pubic separation from 5 to 6 cm. the diameter increases from 12 to 15 mm. in length.

With pubic widening of 5 cm. 6 cm. 7 cm.				
the gain is as follows:				
Pelvis	5 cm.	73 mm.	79 mm.	85 cm.
"	6 "	81 "	86 "	91 "
"	7 "	89 "	93 "	98 "
"	8 "	97 "	101 "	105 "
"	9 "	106 "	109 "	113 "
"	10 "	114 "	118 "	121 "

Mortality. Morisani, from 148 cases of symphysiotomy, gives a mortality of 27.72 per cent. maternal; 47.26 per cent. infantile.

The author, from 73 cases of operation, gives mortality of mothers, 4.1 per cent.; infantile, 24.6 per cent.

The operations were often done under the most unfavorable circumstances. We may also conclude that this operation is rarely followed by ultimate impairment of locomotion or micturition, and the lesions, small or serious, of the genitalia are not different from those that frequently follow difficult or prolonged forceps cases.

Symphysiotomy is best done at the time of complete dilatation. In view of the high mortality of the children where premature labor has been induced in women with contracted pelves, it is deemed best to allow such cases to go to full term and then operate. The chances of the child are thereby increased, provided the degree of narrowing is such as to make the cases suitable for symphysiotomy.

There is a new operation which ought to take its place with symphysiotomy and extend its field: this is ischio-pubiotomy in oblique ovate pelves with synostosis of one sacro-iliac joint. It consists essentially in section of the ascending ramus of the ischium and of the horizontal ramus of the pubis, with destruction of all opposing fibrous parts.

PUERPERAL TETANUS.

HEYSE (*Deutsche med. Wochenschrift*, 1893, No. 14), after citing a number of cases suffering either primarily or secondarily from puerperal tetanus, states that it is interesting to note that the primary sources of infection in these cases were in nearly all either from those working in the ground or among horses. One can, however, only reckon true puerperal tetanus, those cases in which the bacillus has entered the uterus before or during labor. The claim that tetanus belongs to the group of infectious puerperal diseases has not always been admitted, as numerous attempts to inoculate the disease with endometritic material have failed. Cold, filthy surroundings, and wounds of the perineum or vagina have been insisted on as portals for the disease more probable than the necrotic uterine mucous membrane of the puerperium.

The question, whether tetanotoxin or tetanus bacilli capable of development and spores can be maintained in the lochia, is of great importance in regard to the prophylaxis of this disease. He then describes a case where a woman died with all symptoms of acute tetanus (puerperal), and on whom, after death, was found on the left side of the posterior commissure a small, deep, fresh granulating tear. Left from the introitus vaginae was a small ulcer, with thin yellow coat over red granulations; edges smooth and round; no infiltration. No intra-uterine manipulation had been used in the case. Infiltration of the parametrium, or of Douglas's cul-de-sac, was not present. Urine contained albumin, hyaline, fatty, and granular casts.

Section showed heart-exhaustion; uterus as large as a child's head; serosa smooth and shining; muscle dull; no pus.

Cervix showed diphtheritic endometritis. At point of former attachment of placenta, fragments could be found. No thrombi in parametrium; no sign of infection passing beyond the uterine mucous membrane. In the brain

a subdural hæmatoma as large as the palm of the hand was found in the occipito-parietal region. Kidney negative.

Microscopic examination of the uterus showed on the inner wall of the endometrium small masses of staphylococci, but no tetanus bacilli were found. Inoculations of two mice with membrane taken from ulcers and uterus wall resulted in one animal dying of staphylococcus sepsis; the other lived. Five mice and one guinea-pig were injected with material taken during life from the cervix secretion on sterilized cotton. Great care was exercised in keeping this from contact with the ulcers and perineal rent. A mucous plug from the cervix was also withdrawn. All the animals thus inoculated had symptoms of tetanus, and all save one mouse died after seventy to ninety hours. A deep culture on sugar-agar was made in an incubator, and the development of anaërobic bacteria appeared in gas bubbles which came from the cotton. The presence of spore-bearing tetanus bacilli was shown directly from the cervical secretion, and guinea-pigs inoculated from this died; from them a tetanus culture was obtained.

If the lochia of a case of tetanus contains the characteristic bacilli and spores, the case may be regarded as sure.

A culture made from straw, dust, and floor boards, the first from the patient's bed and the remainder from the room in which she died, was injected into mice, all dying of tetanus. A grape-sugar agar culture showed the tetanus bacillus present with others, especially the staphylococcus albus and cereus.

VENAY records 106 cases of puerperal tetanus: 47 after abortion, 59 after delivery; the greater number being near the menopause. According to these statistics the disease may break out from two to fifteen days after birth; commonly from the seventh to eleventh. He considers its prevalence due to the fact that the bacillus lives in dirt, and gives as a cause of the number of cases in the West Indies the custom of the negroes of smearing dirt on the umbilical wound of the child.

Statistics show that it is not the greater operations that are followed by tetanus; tamponing and manual detachment of the placenta are those that are most dangerous.

Venay showed 107 cases: 51 were operative; 20 followed uterine curetting, 17 tamponing, 5 forceps extraction, 3 version and artificial premature labor, 1 each Cæsarean section and curettement. Puerperal tetanus shows a certain connection with puerperal septicæmia, in that it prevails most amid unfavorable surroundings. The reason for the small percentage after great operations is because patients needing these go to infirmaries. Septicæmia is not merely a complication of tetanus, but begets it. Observations seem to prove that the tetanus bacillus cannot thrive save in a prepared soil of some other disease, or it is a mixed infection. French observers maintain that a pure culture of the tetanus bacilli cannot be made if they are freed, by heating to 80°, from the toxin produced. The non-toxic cultures can only produce tetanus when other bacteria are introduced, generally pus-makers, which set up a necrotic inflammation, otherwise the spores fail and are taken up by leucocytes. The other pus-producers, after setting up a massing of leucocytes, form a sort of false membrane, which protects the tetanus bacillus.

A thorough clearing out of the uterus and careful disinfection under chloroform would seem the best treatment. Among medicines, Venay classes

narcotics first, then chloral, and chloroform. Absolute rest, hot baths, wet pack, and withdrawal of bright light and noise.

ECLAMPSIA AND ITS TREATMENT.

MARTIN (*Edinburgh Med. Journ.*, 1893, p. 1125) reports a case of eclampsia occurring in a mill-worker, twenty-one years of age. Family history good. Patient had complained of headache, especially in the morning. Labor was induced, and patient was delivered of a healthy child. The attacks occurred every twelve to sixteen minutes, and terminated fatally at the end of twenty-four hours. During the night preceding death the breathing was stertorous, and six hours before death Cheyne-Stokes respiration set in. No post-mortem could be obtained.

PORTEOUS (*Edinburgh Med. Journ.*, 1893, p. 1162) advances the theory that there are five forms of eclampsia: (1) Hysteric, (2) epileptic, (3) uræmic, (4) apoplectic, (5) microbic. In the microbic there are none of the signs or symptoms of ordinary eclampsia. The kidneys are not at fault; temperature varies little, and the pulse neither quickens nor becomes slower for any length of time.

ACHONDROPLASIA (CHONDRODYSTROPHIA FŒTALIS, OR SO-CALLED FŒTAL RICKETS).

THOMPSON (*Edinburgh Med. Journ.*, 1893, p. 1109), in an article on the above subject, states that many cases of the peculiar deformity often described in text-books as fœtal rickets, cannot be regarded as such. The disease is characterized by an unnatural shortness of the upper and lower limbs, and is separate and distinct from either rickets or cretinism. The cause of this affection is not well understood, but is supposed to be an absence, arrest, or perversion of the normal process of endochondral ossification of the most definite and universal character in every element of the skeleton in which the process normally takes place during intra-uterine life. It would seem that this disease was to some extent inherited. The writer regards as a peculiar feature of the disease that in the hand, when laid flat so that the palm is not hollowed, the fingers being spread out in such a way that their ends are separate from one another and not so close as in the normal hand, the index and middle fingers curve to the radial, the ring and little fingers to the ulnar side. In the article three cases are quoted, all having typical characteristics of the disease.

INVESTIGATION ON THE ANATOMY OF THE CERVIX.

KNÜPFER (*St. Petersburg. medicin. Wochenschrift*, 1893, No. 13, p. 115), after a number of experiments on bats, has demonstrated that birth must ensue when the cervix has widened sufficiently for the descending part to make pressure on the nerve ganglia found at the point of the vaginal insertion; pressure on these ganglia producing contraction of the uterus. After a portion of the pregnancy has passed, the uterus rising beyond the upper border of the lateral ligaments, the enlargement of the cervical canal allows the ganglia to be forced nearer and nearer to the wall of the canal. As

gestation advances, the lower uterine segment is formed. The mesometric ganglia become more and more conspicuous, and the cervix not only expands upward but presses toward the mesometrium. The fundus continuing to arise, a mechanical stimulation of the upper ganglia takes place, causing the first light contractions. With the deeper descent of the foetus, the cervix is stretched and the presenting part approaches the great ganglia, which are prevented by the mesometrium from withdrawing, and the presenting part is allowed to press on the deep ganglia, which are more numerous and larger, and thus strong uterine contractions are set up.

UMBILICAL SEPTIC INFECTION.

IN a discussion before the Königlische Gesellschaft der Aerzte, in Budapest, DOCTOR (*Prager medicin. Wochenschrift*, 1893, No. 13, p. 157) stated that a great percentage of children suffer in early days from fever, etc., from infection of the navel stump. ERÖSS states that in the first year of life 43 per cent. of children had fever, and of these 22 per cent. were due to infection of the navel. From experiments, he concluded that the best results were obtained where the cord was cut quickly after birth and close to the body, leaving a stump only about 1 cm. long. The child should not be bathed for from three to six days after birth. He claims that by these means he reduced the number of cases 3.46 per cent. If the wound secretes longer than two or three weeks after birth, it is in a pathological condition. The quantity and quality of the secretion afford evidences as to the condition: if serous, it is due to a fungoid umbilicus; a purulent secretion usually arising from an infection either general or local.

It was also shown that not bathing the child might tend to produce an intertrigo about the umbilicus. Out of 1000 cases not bathed before the falling off of the cord, none had bad symptoms.

BACTERIOLOGICAL EXAMINATION OF THE LOCHIA.

AFANASSIEW (*Gaz. de Gyn.*, No. 167, p. 173) reports the results of bacteriological investigation of the lochia of 24 parturient women. Out of 68 examinations, he obtained cultures in nearly all the cases. The bacteria diminished in the vagina from without inward, and were fewest at the uterine cavity. They were living and culturable, notwithstanding daily washing of the canal with carbolized water of 2 per cent. strength.

THE EFFECT OF COMPRESSION OF THE ABDOMINAL AORTA FOR THE RELIEF OF UTERINE HEMORRHAGE.

BISHOP, in a lecture delivered at the Ancoats Hospital, Manchester (*Lancet*, 1893, No. xvi.), recommends compression of the aorta in cases of uterine hemorrhage as the quickest and most convenient manner of checking it. Time in this condition is of importance, because the longer hemorrhage lasts, the longer it is likely to continue on account of the general relaxation of the uterine tissue. The uterine arteries, through the internal and common iliac, start from a common source, the aorta, and can be controlled with the greatest ease by pressure upon it. The general condition of relaxation, and par-

ticularly of the abdominal muscles, from the bleeding, greatly favors this method of relief. The hand sinks into the abdomen without opposition until the sacral promontory is reached, and immediately above and to the left the main artery is discovered by its pulsations. He gives an interesting account of the pathology of uterine hemorrhage, and cites two cases of post-partum hemorrhage in which compression of the aorta was successfully used.

ECTOPIC PREGNANCY.

SMITH (*New York Journ. of Gyn. and Obstetrics*, 1893, vol. iii., No. 5) reports an interesting case of a II-para (first child dead when born), to whom he was summoned on June 4, 1891. Patient had been seized with a terrible pain "while weeding a flower-bed." She located this attack in the right iliac region. During the following weeks she had repeated attacks, until August 22, when she died. At the autopsy a mass the size of an orange was found in the right iliac region, involving the Fallopian tube and broad ligament. At one point of this mass the wall had become so attenuated that rupture had taken place into the peritoneal cavity. During the early history of the case some doubt had existed in the minds of the author and his consultants as to the character of the trouble, so that an operation was not considered justifiable.

SPONTANEOUS PARTURITION.

DASS (*Indian Medical Gazette*, 1893, No. 5) reports the case of a Bengali woman, aged forty years, delivered in an erect posture of a mature child. She had done her ordinary duties up to the time of delivery. Loss of blood considerable. Placenta was said to have come away after an hour's time. In afternoon of same day she walked to a railroad station, a distance of two miles. That evening at 10 o'clock she started in a railroad train, riding a distance of ninety-seven miles. During this entire time she had to sit up in the car without sleep. She went through a normal puerperium. Child was said to have been killed by its head striking the floor during birth.

CÆSAREAN SECTION FOR CONTRACTED PELVIS.

BANCROFT (*ibid.*) describes a Hindu III-para who had had one abortion. On admission pelvic measurements were as follows: External—Crests, 9.25 inches; spines, 8 inches; conj. ext., 5.75 inches; centre of vertebral spine to right iliac spine, 7.25 inches, and to left iliac spine, 7 inches. Internal—Pelvis generally small, pelvic arch narrow, promontory of sacrum easily reached by finger, estimated oblique conj., 2.75 inches; marked diminution in left oblique diameter; pelvis diminished in size. Cæsarean section was done, and the patient was delivered of a healthy child. Placenta was attached to the right posterior wall. The cavity was dusted over well with iodoform, and five sutures of carbolized silk were inserted through muscular walls. Considerable bony thickening was found on the right side of the pelvis, diminishing the right oblique diameter. Patient made a good recovery.

PÆDIATRICS.

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 ACQUIRED SYPHILIS OF CHILDHOOD.

IN a recent clinical lecture, reported in the *Medical Press and Circular*, 1893, PROFESSOR FOURNIER groups the sources of acquired syphilis in childhood under four heads: 1. Suckling; 2. Rearing; 3. Criminal Offences; 4. Medical Treatment.

1. *Suckling*. Many children are infected by their nurses; a fact too little recognized, although examples may be reckoned by thousands. In a first group of cases it is a syphilitic nurse that takes the child to suckle, and from a mucous tubercle upon her mouth or breast she infects her charge. In the second group, the nurse is at the same time offender and victim. In the course of her avocation she contracts syphilis, which she hands on to her charge. A healthy nurse may tend an infant which is healthy to all appearances, but she contracts the disease. In her turn she infects either her own offspring or others to whom she may act as a wet-nurse. At other times a healthy nurse takes charge of a healthy child, but she one day chances to give the breast to a strange child that is syphilitic, and she and her charge then become infected. This point the author insists upon, and he attributes to it an astonishing number of cases of syphilis. It is to be remembered, however, that the habit of employing a wet-nurse is very much more common in France than in our own country, where the practice is rapidly being superseded by the more convenient and safer expedient of bottle-feeding.

2. *Rearing*. The child may take syphilis from its family, from servants, from visitors and others.

a. It is often taken from the mother. If a woman contracts syphilis after delivery she may communicate it to her child in various ways, the most common being by the act of kissing.

b. The father is less often at fault, as he has little to do with the child.

c. The infant is often infected by its nurse, either by kissing or in some other way. In this connection it may be noted that many infants live much more in the society of the nurse than of the mother, especially among the better classes of society; hence the frequency of this method of contagion.

d. A child is often infected by other children. It is a common trick with children to put toys and other objects in the mouth.

e. The poison may be communicated by strangers, workmen, or visitors, and usually by the act of kissing.

f. One often sees cases of domestic contagion where from poverty the

utensils are few and are used in common. Thus cases have been contracted from infected feeding-bottles, sponges, and bedding. Vidal de Cassis has reported the case of a poverty-stricken household where one cup was used by six children, four of whom contracted syphilis.

3. *Criminal offences* upon children, followed by syphilis, are rare; still, it is easy to find plenty of instances. At Lourcine one frequently meets with children of ten or twelve and even of six or four years of age who have contracted the disease in this way. This class of crime is not always due to criminal passion, but often to the superstitious belief that an affected person may thus get rid of the disease.

4. *Medical treatment.* As in the case of the adult, a child may be affected by the hands of a medical attendant, or by surgical instruments. Some years ago a veritable endemic of the disease was reported as the result of catheterism by a specialist. Circumcision is answerable for a certain number of cases of the disease, a fact first pointed out by Ricord. Bardinet, of Limoges, relates the case of a midwife who carried on her profession notwithstanding the fact that she had syphilitic lesions on one of her fingers. She infected no less than a hundred persons, directly or indirectly, in the small township of Brives. Lastly, there is vaccination syphilis, which is becoming of very rare occurrence from the general adoption of the animal lymph.

THE INCUBATION OF VARICELLA.

A RECENT observation of GOUGET (*Revue mensuelle des Maladies de l'Enfance*, 1893, p. 120) reopens the discussion upon the length of the incubative period of varicella. According to German authorities this period varies from 13 to 17 days (13 to 14, Henoch; 14 to 15, Gerhardt; 13 to 16, Eichhorst; 13 to 17, Strümpell). Barthé and Lanné believe that it may even be prolonged to 19 days, while English writers fix a minimum of 10 days. In several more recent articles TALAMON (*La Médecine Moderne*, August 6, 1891; *vide THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, March, 1892, p. 358; *ibid.*, May 19, 1892, and January 28, 1893) fixes this period more exactly at 14 days. Steiner and d'Heilly have observed instances of much shorter duration (8 days in Steiner's cases, 3 days in a case of d'Heilly), but these observations were made in cases of the inoculated disease; and it is well known that the incubative stage of the eruptive fevers is shorter when they are transmitted by inoculation than by contagion. Talamon, indeed, observed the development of varicella in a child whose sister had been attacked three days before, but did not hesitate to reject the possibility of an incubation so short, believing that the contagion had been effected by the intermediation of germs from another source, perhaps that from which the sister herself had been infected.

Gouget, in turn, relates the following case: A female infant, aged two months and a half, entered the Hôpital Tenon December 6th with varicella of moderate intensity, which had begun the evening before. Four days later varicella declared itself in a boy of fourteen months, entered the 5th of December, and lying in the adjacent bed. The eruption remained discrete; there were no more than twenty vesicles well disseminated. Four days later, a little girl, four and a half months old, entered the 29th of November, and occupying the next

adjacent bed to the latter case, was taken in turn with confluent varicella. Hereupon the three patients were isolated and no new cases developed. It may be added that there was no varicella in the ward before the arrival of the first of these children, and that no focus of contagion appeared to exist in the neighborhood, for no case of the disease had been brought to the hospital for quite a long time, and none had presented itself subsequently.

Despite the marked variation from the classic type, it is impossible not to be struck by the exactly equal period of apparent incubation in the two latter children. The regular propagation of the affection from bed to bed is also significant. If the second case is disregarded, and the third only attributed to infection from the first case, the incubation would be only eight days, while on the other hand, if referred to the time before entrance to the hospital, the period would be at least sixteen days.

Looking upon the regularity, in a sense mathematical, which was presented in the extension of this little epidemic, and upon the absence of new cases after isolation had been secured, the author is inclined to think that the incubation was reduced to four days in these two cases, and that consequently, under certain circumstances more or less rare, this period may be much shorter than is ordinarily the case. As to these circumstances, it is quite difficult to determine anything definite.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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IMMUNITY.

NOTHING at present engaging the attention of pathologists seems destined to attract such universal attention or to be of such far-reaching benefit to practical medicine as the study of the problems connected with immunity and recovery from infectious disease. It would seem that at last, nearly a century after the first vaccination (May 14, 1796), the obscurity which has prevented any rational explanation of its protective action were to be penetrated, and that the near future might witness the application of similar preventive measures to many of the infectious diseases. Already suggestions for the treatment of some of these diseases, gathered from ascertained facts regarding immunity, have been followed, and in a number of cases with the most gratifying result. In view of these facts, it has seemed appropriate to present to the readers of THE JOURNAL, in a short resumé, some of the principal contributions upon which the prevailing theory of immunity is based.

This theory may be briefly stated as follows: It has long been known that much, perhaps the whole, of the pathogenic influence of bacteria is due to the action of poisonous substances produced by them in the process of their growth. These "toxins," as they have been called, are accountable for the fever, the prostration, and other general symptoms of the infectious diseases, as well as for the anatomical changes (lesions) in the immediate neighborhood of the growing germs. So long as they continue to be produced and to have unrestrained action the disease progresses. But hand-in-hand with the production of these poisonous substances there are produced (by the cells of the body, presumably) certain antagonistic substances which neutralize the toxic principles, and thus prevent their poisonous effect upon the body. These antagonistic principles have been called "antitoxins," and the extent of their production is supposed to measure the degree of immunity. The natural immunity of some species of animals to certain diseases would appear to depend upon the ability of those animals to quickly prepare the antitoxins necessary to neutralize the poisons of the diseases from which they are immune. Artificial immunity, induced by experiment, depends upon the introduction into the body of a sufficient quantity of the specific antitoxin to neutralize the specific toxin. Recovery from the self-limited infectious diseases depends upon the production by the body of the antitoxins necessary to neutralize the specific poisons of the disease.

In 1890, OGATA and JASUHARA published in the *Transactions of the Medical Faculty of the Imperial University of Tokio, Japan* (see *Centralbl. f. Bakt. u. Parasit.*, 1891, ix. p. 25) an account of some remarkable experiments performed by them with a view to determining the influence of the blood of animals naturally immune to anthrax upon the virulence of the anthrax bacillus. The frog, white rat, and dog all possess natural immunity to anthrax, and it was found that cultures of virulent anthrax bacilli when mixed with the blood of these animals, or when grown upon media containing their blood serum, lost their virulence, either not killing at all, or only several days after the death of control animals inoculated at the same time with anthrax cultures not so treated. They furthermore determined that the immunity natural to the frog could be induced in mice by the intra-peritoneal injection of a few drops of frog's or dog's serum. All the mice so treated withstood the anthrax infection when the protective injection was performed at any time between seventy-two hours before and five hours after the anthrax inoculation. They also demonstrated that of seven mice thus rendered immune, six survived an inoculation with virulent anthrax several weeks after the establishment of the immunity, showing the effect to be quite lasting. The blood of other animals not naturally immune to anthrax when similarly injected had no protective action.

In a subsequent paper (*Centralbl. f. Bakt. u. Parasit.*, 1891, ix. p. 597) OGATA relates the result of his efforts to obtain the substance of the blood conferring this immunity, and describes a method of preparing from the blood a substance soluble in water and glycerin, insoluble in alcohol and ether, but not decomposed by them, decomposed by the digestive juices, by warming to 45° C., and by acids, and capable of conferring immunity to anthrax. The glycerin solution of this substance was shown to preserve this power of con-

ferring immunity for a very considerable length of time. It was believed by Ogata to be of the nature of an enzyme, having the power to convert fibrin into peptone and starch into sugar.

Shortly before the appearance of the above-mentioned paper by Ogata, BEHRING and KITASATO (*Deutsche med. Woch.*, 1890, No. 49) published the results of some remarkable experiments demonstrating the power of the blood of animals, made artificially immune to diphtheria and tetanus, to confer that immunity to other animals and to act curatively even after the onset of symptoms of the respective diseases. Thus, a rabbit rendered artificially immune to tetanus was shown to withstand an inoculation of 10 c.c. of a virulent culture of the tetanus bacillus, one-twentieth of which dose was at the same time shown to be fatal to rabbits not thus rendered immune, and the blood of this immune rabbit was further shown to be capable of conferring immunity to mice, which are well known to be particularly susceptible to tetanus.

In 1887 BRIEGER had shown the presence in sterilized cultures of the tetanus bacillus of a substance capable of causing trismus, convulsions, and death when introduced into mice, and later (1888) this substance was obtained from the freshly amputated arm of a patient suffering from tetanus. As the bacilli do not become generally diffused throughout the body in tetanus, it became evident that the exhausting symptoms of the disease must be due to the poisonous effect of the substance above referred to. With these facts in mind and in the hope of throwing some light upon the *modus operandi* of the blood of their immune rabbit in conferring immunity to others, Behring and Kitasato exposed virulent cultures of the tetanus bacillus to the action of its blood serum for twenty-four hours, after which it was found that doses of the cultures so treated three hundred times greater than the fatal dose of the same culture before such treatment were innocuous. They were, therefore, led to conclude that the serum of an immune animal possesses a most potent neutralizing action upon the poisons of the tetanus bacillus.

Simultaneously with the publication of these experiments of Behring and Kitasato there appeared in the *Berliner klinische Wochenschrift*, 1890, No. 49, an article by BRIEGER and FRAENKEL on immunity from diphtheria, in which they described the induction of immunity by the inoculation of guinea-pigs with a three weeks' old bouillon culture of Loeffler's bacillus which had been heated for one hour to a temperature of 60–70° C. They found that the immunity was not immediately produced, but was gradually developed, until, two weeks after such an inoculation, it became complete. Even after this time slight local diphtheritic inflammation was produced by inoculation of a virulent culture, but none of the animals died. The power of attenuated virus to thus gradually induce immunity to the virulent poison of a disease had previously been shown by Pasteur as regards anthrax and hydrophobia.

In an earlier paper (*Berl. klin. Woch.*, 1890, Nos. 11 and 12) Brieger and Fraenkel had described the specific poison of diphtheria and had found it to be an albuminous substance, a "toxalbumin," exceedingly powerful in its action, but deprived of its poisonous properties by heating to a temperature of from 55° to 60° C. Because the immunizing substance withstood a higher temperature than this without impairment of its activity, Fraenkel was led

to believe the toxic and the immunizing substances to be separate and distinct bodies. The exact nature of the protective substance was not determined.

Behring and Kitasato had not described the manner in which the immunity of their animals had been obtained in the first instance, but after the publication of the work of Brieger and Fraenkel, an article by BEHRING (*Deutsche med. Woch.*, 1890, No. 50) described at length five different methods by which this might be accomplished in the case of diphtheria:

1. The first of these was dependent upon attenuation of the virus, and was identical with the method employed by Brieger and Fraenkel.

2. In the second, rather old cultures of the diphtheria bacillus were treated with very weak solutions of trichloride of iodine, and after two inoculations with the resulting mixture the animals proved immune to virulent cultures.

3. The bacteria-free pleuritic exudate of guinea-pigs which had died as the result of inoculation with Loeffler's bacillus, when injected in small quantity into healthy guinea-pigs made them very sick for several days, but on recovery they were found to be immune.

4. In a few cases, animals which had been inoculated with virulent diphtheria culture recovered as the result of careful treatment (particularly with iodine trichloride); these animals were found to be immune, but it was discovered that injections of iodine trichloride alone had no immunizing action.

5. But treatment with small quantities of hydrogen peroxide on several successive days before inoculation produced a more or less perfect immunity. It was shown that the blood serum of animals immunized by any of these methods, though having no actual germicidal quality, was still in some way able to neutralize the poisonous effects of the products of Loeffler's bacillus, and it was further shown that treatment with this serum was quickly followed by amelioration of the symptoms, and that in this way recovery could be brought about after otherwise fatal doses of the virulent culture. The possibility of curing acute infectious diseases by treatment with the serum of immunized animals was thus suggested, and it was also suggested that the immunizing and curative principle of the blood serum acts as a chemical antidote, not as a germicide.

Working along the same lines as Behring and Kitasato, TIZZONI and CATANI (various articles in *Riforma Medica* for 1890 and 1891, reviewed in *Centralbl. f. Path. Anat.*, 1891, ii., No. 16, 666), arrived at a similar result as far as the production of an artificial immunity was concerned, and they also demonstrated the power of the blood serum of an immunized animal to confer immunity to others. The smallness of the amount of serum necessary to the establishment of immunity suggested to them the probability that the neutralizing substance was of the nature of a ferment, in some manner disintegrating the toxins of tetanus. This theory, it will be remembered, had previously been advanced by Ogata. In a subsequent communication (*Centralbl. f. Bakt. u. Parasit.*, 1891, ix., No. 21, 685) they recount experiments which bear out this supposition, and they conclude that the tetanus "antitoxin," as they now call it, is an albuminous body of the nature of an enzyme, but not identical with the fibrin ferment of the blood. Still further experiments (*Centralbl. f. Bakt. u. Parasit.*, 1891, x., Nos. 2 and 3), showed this to belong to the globulins.

While these researches regarding immunity to tetanus and diphtheria were

in progress in Berlin and Bologna similar experiments were being carried on in Munich with the virus of pneumonia, and EMMERICH and FOWITZKY (*Münch. med. Woch.*, 1891, No. 32, p. 554) succeeded in producing artificial immunity in rabbits by inoculation of very small quantities of virulent cultures of the pneumococcus, the dose each day being increased until the immunity was complete. They found the serum of such immune animals to be capable of curing rabbits and mice suffering from pneumo-septicæmia, if introduced soon after the onset of symptoms. No therapeutic experiments upon patients suffering from pneumonia were undertaken.

A similar immunity to pneumonia was obtained by the brothers G and F. KLEMPERER (*Berl. klin. Woch.* 1891, Nos. 34 and 35) by the injection of sputum of convalescents from pneumonia, of pus from empyema complicating pneumonia, of cultures of the pneumococcus attenuated by heat, and of a glycerin extract of an agar culture. It was later shown that the blood serum of convalescents from pneumonia was also capable of conferring immunity to rabbits. The immunity produced by all these methods appeared to be identical. In general it was found to be developed in three or four days when the protective substance was injected into the veins, but only after two weeks when introduced subcutaneously. The duration of the immunity varied in different cases, but was in some as long as six months.

The protective substance was found to be incapable of curing animals suffering from pneumo-septicæmia, but, on the other hand, a distinctly beneficial effect was noted after injections of the serum of immune animals, the result of such injections being uniformly beneficial in twenty-four rabbits suffering from pronounced symptoms.

In searching for an explanation of these results, the Klemperers separated from cultures of the pneumococcus a toxalbumin, poisonous in large doses, but capable in small doses of conferring immunity in animals. This had, however, no germicidal action, nor healing quality, and they were led to believe the immunity produced in their experiments to be due to the development in the body, through the agency in some way of this toxalbumin, of an antagonistic substance capable of preventing the development of the disease. This substance they have called "anti-pneumotoxin." They believe the potency of the serum of immune animals to convey immunity and to act curatively on other animals affected with pneumo-septicæmia to depend upon its content of anti-pneumotoxin, not upon any germicidal action of the blood serum. So convinced were they of the correctness of this view that they ventured to test the therapeutic value of the serum of their immunized animals in cases of acute lobar pneumonia. Having demonstrated its harmlessness by personal injections, they employed it subcutaneously in six cases of pneumonia. In all there resulted a decided reduction of temperature and a slowing of the pulse and respiration. In two of the cases the temperature remained normal after the treatment; in the others it slowly rose again six hours or so after the injection. That they were not simply dealing with an antipyretic was shown by the entire absence of any noticeable effect on patients affected with typhoid fever.

At about this time the theory of antitoxins was strengthened by the report of experiments by EHRLICH (*Deutsche medicinische Wochenschrift*, 1891, Nos. 32 and 44) upon immunity from the poisonous effects of the two vege-

table alkaloids, ricin and abrin. The immunity was produced in each case by the addition of very small quantities of the poison to the food of mice, the dose being increased from day to day, until after six days of such treatment an immunity was induced which protected the mice from doses of ricin from 200 to 800 times stronger than the usual fatal dose, and from doses of abrin 400 times the strength of the ordinary fatal dose. In both cases the immunity protected from the local inflammatory reaction as well as from the general symptoms (diarrhœa, collapse). In seeking an explanation of this remarkable immunity, Ehrlich separated from the blood of his immune animals in each case a substance capable of completely neutralizing the action of the alkaloid. These he has designated "anti-ricin" and "anti-abrin." Injections of the blood of immune animals established an immunity varying in degree with the degree of immunity of the animal from which the blood was taken and according to the amount injected; in other words, according to the amount of anti-ricin or anti-abrin introduced; but the degree of immunity so produced was never comparable to that obtained by the method of feeding.

From his observations Ehrlich was led to believe that the antidote formed remained for some considerable time in the body, as the immunity produced was of some duration, though its exact duration was not determined.

Animals immune to ricin were found to be fully susceptible to abrin, and *vice versa*, showing the antidotes in each case to be specifically antagonistic to one particular poison only and not to produce any generally efficient immunity, and Ehrlich argues therefrom that the antidotes in the two cases must be separate and distinct bodies.

These experiments of Ehrlich are strongly suggestive of a purely chemical antagonism between the antitoxins formed in the blood of immune animals and the poisons of the infectious diseases from which they are protected, the analogy being complete in every essential particular between the immunity to the alkaloids ricin and abrin and that to the infectious diseases which have been the subject of similar study.

It is not the purpose of this review to present every item of proof of the theory whose development we have been tracing, but rather to show a sufficient basis for its use as a good working hypothesis. This was believed to have been shown at the time of which we have just been speaking (1891), and soon reports of interesting therapeutic applications of the principles of the theory began to appear, more particularly in the case of tetanus. As their result furnishes an important factor in support of our theory, they will form the subject of a subsequent notice.

THE BLOOD IN PURPURA HEMORRHAGICA.

INTERESTING light has recently been thrown upon the obscure pathology of purpura by observations made by DENYS (*Centralbl. für allgemeine Pathologie und Pathologische Anatomie*, 1893, iv., No. 5, p. 174) in a fatal case of the disease. The patient, a woman, suffered for several days from gastro-intestinal disorder of indefinite nature until three days prior to her death, when she began to bleed profusely from the vagina, without apparent cause. She was not seen by Denys until six hours before her death, when she was found to

be excessively anæmic and to be covered with small hæmorrhagic spots of a dark-red color. There was only very slight fever (38.2° C.), no pain, and, notwithstanding great prostration, the mind was clear. Examination of blood taken from the finger-tip, with all the precautions necessary in such observations, showed marked diminution in the number of red corpuscles, and increase in the leucocytes. Peculiar small bodies, spherical in shape, and somewhat resembling the nuclei of white corpuscles, were present in considerable numbers. They showed no tendency to adhere to one another or to surrounding objects, and were believed to be fragments of disintegrating leucocytes. No blood plaques were seen, though carefully searched for, and Denys was led to believe them to have been entirely absent in this case. Cultures made at the autopsy (forty-eight hours after death) from the tissues and from the hæmorrhagic spots, and subsequent microscopic examination disclosed nothing of importance relative to a possible mycotic origin of the disease, though long slender bacilli were found in places alone in the tissues of the intestine, but not elsewhere.

[In so far as the absence of blood plaques is concerned, this case is in interesting accord with three others previously studied by Denys, in which diminution in the number of blood plaques was the most notable blood change. Should this observation receive corroboration the multiple hemorrhages in purpura would readily be explained, as the blood plaques are now generally believed to play an important rôle in coagulation. Slight lesions in the blood-vessels have heretofore been observed as constantly present in purpura. So long as blood plaques are abundant in the blood considerable lesions in the vascular walls may be of but slight significance, thrombi quickly preventing the escape of any considerable quantity of blood. But in the absence of these important factors in thrombosis degenerative changes in the bloodvessels ordinarily insignificant may readily permit very considerable hemorrhage. Denys very properly attaches no importance to the bacilli met with in his observations. The autopsy was performed too long after death to afford reliable results, and the micro-organisms were of too limited distribution to be of any real significance.]

THE PREVALENCE OF CANCER AND ITS INCREASE.

IN a communication to the Manchester Medical Society (*Medical Chronicle*, February, 1893), W. ROGER WILLIAMS draws attention to the steady increase in the prevalence of cancer throughout the civilized world. His statistics are gathered chiefly from the records of Great Britain, and show that in England and Wales in 1838, the year after the passage of the Registration Act, 2448 deaths were attributed to cancer, or 1 in 140 of the total mortality; in 1890 the deaths due to it numbered 19,433, being 1 in 28 of the total mortality. Thus the proportionate mortality from cancer now is five times greater than it was a half-century ago. Williams estimates from the extent of its mortality and the average duration of the disease, that there cannot be fewer than 60,000 persons now suffering from cancer in England and Wales. The returns for Scotland exhibit a similar state of things, the proportion of deaths from cancer to the total mortality having increased from 1 to 35 in 1884 to 1 to 27 in 1889.

"In most civilized countries where statistical records have been kept similar increases have been observed. In Norway the cancer deaths increased from 32 per 1000 of the total mortality in 1877 to 60 per 1000 in 1886-87. In the Netherlands the increase was from 4.9 per 10,000 living in 1867-79 to 6.5 in 1884-88, and in Prussia from 3.1 in 1881 to 3.8 in 1887. Brussels is credited with an increase from 3.9 in 1864-73 to 4.2 in 1874-78, and in New York the rise was from 4 in 1875 to 5.3 in 1885.

"In all the above instances the augmented cancer mortality has coincided with progressive population, increased national wealth, and marked improvement in the general well-being. It seems to me impossible to regard these coincidences otherwise than as the result of cause and effect.

"It accords with his view that in Ireland—where the converse conditions have prevailed, viz., decrease of population and widespread poverty—the cancer death-rate has been much lower than in either of the sister countries, and for many years it has shown no such marked increase as in the latter, but has often remained stationary or has even declined."

Interesting facts about the increasing cancer mortality of Great Britain are that it has affected males to a much greater extent than females, and that for both sexes the percentage of cancer deaths in persons above fifty-five years of age is greater than formerly, showing that the increased mortality is chiefly among persons of advanced age.

THE ASSOCIATION OF TYPHOID FEVER AND ACUTE MILIARY TUBERCULOSIS.

THE association of distinct species of infectious micro-organisms ("mixed infections") has excited considerable attention of late as explaining the puzzling departures from the ordinary clinical history of some of the infectious diseases. So far as we are aware, the simultaneous occurrence of typhoid fever and acute miliary tuberculosis had not been noted until the recent report of such a case by KIÉNER and VILLARD (*Comptes-rendus hebdomadaires des Séances de la Société de Biologie*, 1893, v., No. 1, p. 14). Unfortunately, the history of their case is not given, but the autopsy and cultures from the spleen, which were most thoroughly studied, showed unmistakably to the minds of the authors the presence of the typhoid bacillus in association with widely distributed lesions of acute tuberculosis. An interesting feature of the case is the association of typhoid and tubercular ulcers in the small intestine. These could be distinguished by the presence of induration and the occurrence of miliary tubercles on the peritoneal surface of the tubercular lesions, and by their entire absence in the typhoid.

ON THE HEREDITARY TRANSMISSION OF TUBERCULOSIS.

IN an exhaustive article of 152 pages, GÄRTNER (*Zeitschrift für Hygiene und Infektionskrankheiten*, 1893, xiii. 101) reviews the present status of our knowledge upon the heredity of tuberculosis and adds experiments of his own demonstrating the direct transmission of the germs of the disease in animals from parent to fœtus. The comprehensive nature of the article precludes the giving in this place of more than the briefest statement of the conclusions reached.

Two factors demand attention in every consideration of the influence of heredity upon the transmission of an infectious disease: the influence of inherited predisposition, and the possibility of direct transmission of the specific germs from the parent to offspring. A thorough consideration of the subject from every point of view leads Gärtner to assert the existence of a certain varying degree of predisposition in different persons as regards tuberculosis, showing itself in the more easy acquisition of the disease in some cases than in others, and its more rapid progress. All debilitating influences, whether of general or local action, increase this predisposition, and the same is true as regards mechanical injury and changes in the chemical constitution of the cells and fluids of the body. The predisposition established by any of these means may be transmitted in a measure to succeeding generations.

Because of the uncertain result which has followed efforts to experimentally attenuate the tubercle bacillus, Gärtner discards the idea that tubercle bacilli of different degrees of virulence occur in nature and are accountable for different degrees of severity of the disease.

In his experiments Gärtner made use of mice, canaries, and rabbits. From the frequent direct transmission of tubercle bacilli from the mother to the foetus (or egg) in the case of these animals, he concludes that a similar transmission of the disease in the case of man is less infrequent than has been supposed. This view is borne out by the high mortality from tuberculosis during the first year, higher than at any other period of life and decreasing during the first five years in geometrical ratio (16, 8, 4, 2, 1). Furthermore, the absence of symptoms of tuberculosis in a newborn child is not to be regarded as evidence that it may not have acquired the disease by direct transmission from the mother in consideration of the slow development of the disease and of the probability that infection has occurred during the latter half of gestation.

This direct transmission of the disease is believed by Gärtner to come solely from the mother, for he found it impossible in his experiments to obtain infected offspring when the mother was healthy, even though the semen of the father was teeming with tubercle bacilli. Under these circumstances the disease was frequently transmitted to the generative organs of the mother, but never to the foetus resulting from the contact.

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LAPARO-HYSTEROTOMY: ITS INDICATIONS AND TECHNIQUE.¹

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WE live in an age of great unrest in medical literature. Books written only yesterday are old to-day. Operations perfected and highly recommended to-day are condemned to-morrow. To recite what has been brought forward as new during the last year in any one of the departments that I am expected to represent would require more of your time than I deem prudent to occupy. I have, therefore, decided to be more in accord with the spirit than the letter of the requirements of this Society in the selection of the subject for this paper. Instead of presenting to you in a condensed form the work of others, or an account of my experience in surgery during the last year, I will call your attention to a few salient points on laparo-hysterotomy, a subject of equal interest to the surgeon, the obstetrician, and the gynecologist. The term laparo-hysterotomy signifies cutting into the uterus from the peritoneal cavity after abdominal section. In operative surgery this designation should be used to indicate an operation by which a foetus or a tumor is removed from the interior of the uterus through an abdominal incision, followed by suturing of the visceral and abdominal wounds. The delivery of the foetus by laparo-hysterotomy has been known since the time of Caesar as Cæsarean section. Modern nomenclature, as far as the names of

¹ Being the Address on Surgery, Obstetrics, and Gynecology delivered before the Illinois State Medical Society, May 16, 1893.

operations are concerned, should be established as far as possible on an anatomical basis; hence the old expression, Cæsarean section, should give way to the more modern and accurate term laparo-hysterotomy. The same operation is also applicable in the treatment of certain forms of uterine myo-fibroma, to which, of course, the old nomenclature would have no reference.

INDICATIONS.—In obstetric practice, laparo-hysterotomy will always hold a permanent place as a legitimate procedure. Improvement in its technique, rigid observance of antiseptic precautions and careful selection of cases, will be sure to enlarge its range of application, and expand its sphere of usefulness. At no distant day it will limit laparo-hystero-oöphorectomy, or Porro's operation, to cases in which the uterus in itself constitutes a source of immediate or remote danger. It is a safer operation than Porro's. Out of 149 laparo-hysterotomies performed on the Continent of Europe, 108 mothers and 136 children were saved. Out of 80 operations in Germany, death of the mother occurred in twelve. The best results have been obtained by Schauta, 15 cases without a death; Leopold, 17 cases, with three deaths; and Zweifel 29 cases, with only one death. Porro's operation is attended by a greater mortality, and it is at the same time a mutilating procedure; and no surgeon has a moral right to add to the gravity of an operation for the purpose of preventing conception in the future. The prophylactic part of the operation is not founded on justice, and is not in accordance with modern surgical teaching, and should not be seriously considered by the conscientious practitioner unless the uterus itself is the seat of a life-threatening, removable disease. Cases have been reported in which laparo-hysterotomy was repeatedly performed with success on the same patient. In fact, I am of the opinion that a second and successive operations are fraught with less immediate danger to life than the first. The modification of Porro's operation, removal of the inverted uterus by the vagina, recommended by Francke, and strongly urged by John Bartlett, of Chicago ("A Proposed Modification of Porro's Operation," Chicago, 1886), presents no special merits in the light of modern conservative surgery, and it is to be hoped that it will be limited in the future to the removal of a diseased uterus. More important is a careful consideration of the comparative merits of laparo-hysterotomy and craniotomy. Fortunately, the opinion is gradually gaining ground that the removal of a living child by craniotomy is a relic of the barbarous age, and is being regarded, from a legal as well as a moral standpoint, as a crime. The defenceless babes in their mothers' wombs have legal rights, which let us hope will be respected more in the future than has been the case in the past. The wilful and premeditated destruction of the life of a child on its way into the world has ceased to be a justifiable procedure, and should no longer receive the sanction of the teachers of obstetrics and the pro-

fession. A resort to craniotomy should be limited to cases in which the physician can satisfy himself that the child is dead, and its removal *per vias naturales* is attended by less danger to the mother than a laparo-hysterotomy. In a very able address delivered before the Obstetrical Section of the Ninth International Medical Congress, Professor Miller, of Chicago, clearly laid down the indications and contra-indications of craniotomy. He expressed the belief that the cases admitting of no discussion were first, when the child is dead; here, craniotomy is indicated, if the pelvic diameters are sufficient to admit of the extraction of a mutilated child without greater danger to the mother than would arise from delivery through an abdominal incision. He further stated that the second class of cases, in which the course to be pursued is clear, are those in which the antero-posterior diameter of the pelvis is less than two inches. Here the dangers to the mother, incident to craniotomy, are as great as in delivery by laparo-hysterotomy, and there is good prospect of saving the life of the child by the latter operation. In the cases in which the shortest diameter of the pelvis is three and three-fourths inches, he regards laparo-hysterotomy and craniotomy contra-indicated, and an attempt should be made to deliver the child through the normal channel without mutilation.

The statistics of mutilating vaginal operations collected by Dr. E. P. Davis, in his article in the *American System of Obstetrics*, include 1000 cases by the ablest obstetricians, show a maternal mortality of about 8 per cent. McKelway, in a paper read before the American Medical Association at its meeting in Detroit, expresses himself as follows concerning the results obtainable by laparo-hysterotomy: "I believe it fair to state that the mortality of the improved Cæsarean section, done in women not exhausted by labor, and done under proper antiseptic or aseptic precautions, by skilful operators, is not over 10 per cent." I will go one step further, and make the claim that, in well selected cases, the maternal mortality of laparo-hysterotomy is not greater than the mortality of ovariectomy in the hands of the same operators. Laparo-hysterotomy is absolutely indicated in all cases where the conjugata vera is below two and three-quarter inches, whether the child is living or dead, because the dangers incident to the mother from a craniotomy would more than overbalance the maternal risks of this operation. It is also the operation of selection when the obstruction to delivery is due to the existence of a pelvic tumor or malignant disease of the cervix. In view of these facts, it is only a just inference to conclude that in the future craniotomy should be limited to the extraction of a dead child, in cases in which this procedure does not incur more risk to the life of the mother than laparo-hysterotomy, and that in all other cases a healthy living child should be delivered without mutilation, by the natural process by the aid of forceps, turning, symphysiotomy, or by laparo-hysterotomy.

Symphysiotomy has recently again come into prominence as a formidable competitor of laparo-hysterotomy. It is certainly to the interests of the children yet unborn that this operation is being perfected, and that it has met with such a warm reception on the part of the profession here and abroad. It will add its share toward limiting craniotomy to its legitimate sphere. Its value as a life-saving measure to the child, its dangers as an operation to the mother, must be established by future experience. I fear, however, that many children will be sacrificed by substituting this operation for laparo-hysterotomy in many cases of contracted pelvises. I am also confident that the permanent damage done to the mother is much greater than we have been led to believe by the enthusiastic reports recently published. Time and experience are important factors in determining the safety and value of any operation. It is difficult for me to conceive how the mechanical obstacles to delivery are to be overcome by this operation in any case in which the child is of normal size and the narrowest diameter of the pelvis is less than three inches.

Schauta (*Internat. klinische Rundschau*, 1893, 10) made experiments on the pelvis of the cadaver of a woman, and found the following increase in the diameters with five centimeters of separation of the pubic bones: Conj. vera, + 1 c.m.; trans. maj., + 2.1 c.m.; trans. ant., + 2.8 c.m.; transverse (outlet), + 3.5 c.m.; straight (outlet), + 0.3 c.m.

With the knowledge thus obtained he made three successful symphysiotomies in cases of contracted pelvises.

According to the experiments of Kilian, the utmost extent to which the conjugate diameter can be increased by symphysiotomy amounts to only 1.3 c.m. In some cases, also, the sacro-iliac synchondroses are so firmly fixed that no justifiable amount of force would affect separation to a sufficient extent to be of any value in overcoming pelvic contraction. Injury to the sacro-iliac synchondroses, vesico-vaginal fistulæ, incontinence of urine, an uncertain tottering gait, prolapse of the uterus, phlegmonous inflammation, caries or necrosis of the pubic bone, are some of the immediate and remote consequences to the mother which may follow this operation. I am, therefore, inclined to believe that this operation, which has sprung into such prominence in so short a time, will be limited to its proper sphere in the near future, and will be resorted to as a life-saving measure to both mother and child in cases in which there is only a slight disproportion between the size of the child and the pelvis. It is, of course, strictly contra-indicated in all cases in which the obstacle to a normal delivery is a pelvic tumor or malignant disease of the uterus. A somewhat unusual indication for laparo-hysterotomy is the removal of certain tumors of the uterus. Enucleation of subserous myo-fibromata of the uterus through an incision in the abdominal wall is an established and well recognized operation. This operation, however, is not applicable in cases in which the tumor is located so near

the mucous membrane that by its removal by enucleation the uterine cavity is opened. The class of cases in which I wish to recommend laparo-hysterotomy is when the tumor is single, large, and projects into the uterine cavity or cervical canal, in other words, isolated, submucous myo-fibroma not adapted for removal through the vagina. I shall further on report a case of this kind successfully operated on by this method.

TECHNIQUE.

I shall forego the tedious task of describing the different methods which have been devised to effect delivery through the supra-pubic route. I will content myself in giving you a description of the method of operating which I adopted in the two cases which came under my own observation, and which will be recorded in this paper.

Time of Operation.—Authorities, with few exceptions, are agreed upon this point. The consensus of opinion of nearly all modern writers on obstetrics is to the effect that the best results concerning both mother and child are obtained when the operation is performed during labor. The danger from hemorrhage and septic infection is greatly diminished by firm uterine contractions. Coe (*Medical News*, October 8, 1892), of New York, pleads in favor of elective laparo-hysterotomy, and claims that the results are as good as when the operation is postponed until labor has commenced. If the operation is done during labor it should never be delayed unnecessarily, and should not be performed as a last resort, but as soon as it can be determined that it is necessary. Exhaustion, resulting from protracted ineffectual labor pains, greatly adds to the immediate risks of the operation and increases the liability to septic infection. The greatest difficulties encountered in the selection of the proper time are, of course, met with in primiparæ. The attending physician must often rely on his own judgment in deciding upon the propriety of the operation. In cases in which labor does not progress satisfactorily, the capacity of the pelvis should be determined by a careful examination. If this shows that a living child cannot be born, a prompt decision should be made, assistance summoned, and the necessary preparations made. In multiparæ, the previous history is of much importance. If one or more children have been previously delivered by craniotomy, it is more than probable that a laparo-hysterotomy will become necessary.

Preparations.—In all cases in which it can be ascertained beforehand that a laparo-hysterotomy should be done, the patient should be advised to enter a hospital several days before the expected labor, and if this is impracticable she should be brought to some place within easy reach of her attendant. Laxatives and warm baths are important preparatory measures. The room, bed, clothing, etc., must be properly attended to

in making the preparations for the operation. The field of operation, hands of operator and assistants, instruments, sutures and ligatures must be rendered aseptic by strict attention to antiseptic details. Very few instruments are required. A scalpel, half a dozen hæmostatic forceps, scissors, needles, and a piece of aseptic rubber-tubing, half an inch in diameter and about two feet in length, will be all that the surgeon will need. For suturing the uterine incision a small darning needle answers an excellent purpose. Catgut, silk, and silkworm-gut, and a number of aseptic towels and napkins should be at hand. After all the antiseptic precautions have been carried out, nothing but sterilized warm water will be required during the operation. Chloroform should be used as an anæsthetic in preference to ether.

External Incision.—The external incision is made in the median line, commencing at a point just below the umbilicus. It should only be large enough to permit the passage of the child without tearing. It need not exceed six inches in length. The abdominal wall in the linea alba in pregnant women at the end of gestation is exceedingly thin, often not much thicker than a piece of ordinary blotting paper. It has not infrequently happened that the operator not only cut through the entire thickness of the abdominal wall in making the first incision, but at the same time wounded unintentionally the uterus. The first incision should only divide the skin and superficial fascia, and the remaining structures should be lifted away from the uterus and divided between two dissecting forceps, after which the incision is enlarged by cutting between two fingers.

Uterine Incision.—The pregnant uterus pushes before it the intestines and omentum as it ascends from the pelvis; hence, after opening the peritoneal cavity the only thing that can be seen is the anterior wall of the uterus. The uterine incision should be made in such place and in such a manner as to limit the hemorrhage to a minimum. The uterine vessels are smallest and least numerous in the median line and away from the cervix. The opening in the uterus should, therefore, be made in the median line, half-way between the cornua, and should not extend any farther in the direction of the cervix than is absolutely necessary. Statistics show that twenty years ago Cæsarean section performed by horned animals yielded better results than those done by physicians. (Harris.)

It is a well-known fact in surgery that lacerated wounds bleed much less profusely than incised wounds. I am inclined to believe that the difference in the mortality attending the unskilful and skilful Cæsarean sections was largely due to the difference in the amount of blood lost and character of the wound; in the former the opening in the uterus was made by tearing, in the latter it was made by a clean cut with a sharp knife. Sudden loss of blood makes a more profound impression

than if the same amount of blood is lost gradually. The large uterine sinuses when divided by a sharp instrument do not retract, consequently spontaneous arrest of hemorrhage occurs slowly or not at all, but when the sinuses are torn the lumina are blocked at least in part by torn lacerated tissue, a condition which favors the formation of a thrombus upon which depends the spontaneous arrest of bleeding.

Murdoch Cameron ("The Prevention of Hemorrhage in Cæsarean Section," *British Medical Journal*, December 24, 1892) has recently introduced the use of a pessary for compressing the uterus at this stage, and this enables the operator, he claims, to cut down upon the membranes without puncturing them. I do not believe that this or any other kind of hæmostatic device is necessary before the delivery of the child, as the amount of blood lost during the time required in making the uterine incision and extraction of the child does not exceed that attending an ordinary delivery, provided the uterine opening is made quickly, and by tearing in place of cutting. The uterus should not only be in the middle line, but an examination should be made to ascertain that it is not twisted on its axis. Should this be the case the malposition should be corrected before the visceral wound is made. The median line of the anterior uterine wall can be ascertained by observing the location of the Fallopian tubes. If these occupy the same relative position, a point halfway between them will correspond to the abdominal incision. In order to limit the hemorrhage to a minimum without any artificial hæmostatic agent, I make an incision in the median line of the uterus about six inches in length, cutting down to but not into the large vessels. This incision should terminate two inches or more above the cervix. An assistant now makes pressure on each side of the abdomen in such a manner as to retract the margins of the abdominal incision, and bringing at the same time the uterus well forward into the external incision. The lateral pressure prevents the escape of blood and amniotic fluid into the abdominal cavity. With one cut of the scalpel a button-hole is now made in the centre of the superficial incision, which penetrates the entire thickness of the uterine wall and without any reference to the location of the placenta. Both index fingers are inserted into this opening, which is then enlarged to the requisite size by tearing. The superficial incised wound determines the direction of the lacerated wound. The tear in the deeper tissues may take place somewhat obliquely, but this is not detrimental either in the delivery of the child or the suturing of the wound. Only a few seconds are required in making the opening in the uterus.

Extraction of the Child.—As soon as the opening in the uterus is made the operator plunges the right hand into the uterus and quickly grasps one or both feet and delivers the child as speedily as possible by traction, while the assistant keeps up lateral pressure. The hemorrhage is greatly

diminished, or nearly arrested, as soon as the surface of the wound is compressed by the body of the child. As little time as possible should, therefore, be lost from the moment the uterine incision is commenced until this stage of the delivery is reached. The uterine incision and delivery of the child can be completed in less than a minute.

Elastic Constriction.—I cannot deprecate too strongly preliminary elastic constriction of the uterus. The time occupied in the application of the elastic constrictor and the rough handling of the abdominal contents cannot fail in adding an increased risk to the operation and endangering the life of the child, while as a blood-saving procedure it is certainly unnecessary. Elastic constriction has been charged with causing post-partum hemorrhage by Veit, Doléris, Pajot, Zweifel, Säger, and Lusk. We must, therefore, admit that while its use may prevent bleeding during the early stage of the operation, it is apt to be followed by increased hemorrhage after its removal. This objection holds good when it is resorted to before the delivery of the child. Its employment after this has been accomplished is attended by benefit. At this stage of the operation no time should be lost in attempts to remove the placenta. If the placenta is implanted over the incision it should be dealt with in the same way as in the delivery of the child in cases of placenta prævia. As soon as the child is delivered the uterus should be brought out of the abdominal incision and constricted with a rubber tube the size of the little finger at a point below the visceral incision. Instead of tying the ligature, it is better to cross it; after making the constriction firm enough, clamp it at this point with a pair of hæmostatic forceps. Prior to making the constriction the uterus should be firmly compressed, so as to empty it as far as possible of venous blood. After the constrictor has been applied, the abdominal wound behind and above the uterus should be covered with a large aseptic compress wrung out of hot sterilized water. This prevents the entrance of blood into the abdominal cavity during the further steps of the operation, and also guards against the escape of the intestines.

Removal of the Placenta.—At this stage of the operation the placenta will be found partially or completely detached, and should be removed *in toto* with the membranes. If the placenta is adherent, it is separated at the margin nearest the wound, when complete detachment is effected by inserting the tips of the four fingers of one hand between it and the uterus. Fragments of membranes are looked for and removed. The interior of the uterus is then cleansed and lightly dusted with iodoform for the purpose of preventing putrefaction of the blood, which accumulates after suturing of the uterine wound. During this part of the operation it is important to secure uterine contraction by rubbing, and, if necessary, by douching with hot water. Should these measures fail

the introduction of a piece of ice into the uterine cavity may bring about the desired response.

Suturing of the Uterine Wound.—This constitutes the most important and prolonged part of the operation. The suturing must be done in a manner that will secure such accurate approximation of the incised and torn surfaces as to arrest bleeding by pressure, and at the same time separate perfectly the uterine from the peritoneal cavity. Only round needles should be used, a small darning needle for the large and an ordinary sewing needle for the fine sutures. I use four rows of sutures, three of catgut and one of silk. The first row is made of medium-sized catgut sutures, half an inch apart, and including the entire thickness of the uterine wall with the exception of the peritoneum. This row of sutures is intended to bring and hold in contact the surfaces of the wound, and should, therefore, include considerable tissue on each side. After the sutures have been tied there will be found a little gaping between them; this is overcome by applying a continued suture of fine catgut, which should bring in accurate contact everything else except the peritoneum. The next step in suturing is to bring in contact a strip of the serous surfaces, about one-third of an inch in width the entire length of the wound, by a third row of sutures. This row of sutures is intended to invert the serous margin of the wound on each side to the depth of at least one-third of an inch. A small darning needle and medium-sized braided silk are used in applying these sutures. The sutures are made to include the peritoneum and considerable of the muscular tissue, so as to insure a firm hold. The needle is entered about one-third of an inch from the margin of the wound, and is made to emerge a few lines from the edge, when it is made to enter at a corresponding point on the opposite side, and is brought out one-third of an inch from the margin of the wound. Two sutures to the inch will answer the purpose. The third row of sutures is buried by a continued suture of fine catgut, which includes only the peritoneum and subserous connective tissue. If all of the sutures are properly inserted and tied they can be relied upon in preventing hemorrhage after the removal of the constrictor, even in cases in which the uterus does not contract firmly. The constrictor is now removed and contractions of the uterus secured before the organ is replaced into the abdominal cavity.

Inertia of Uterus.—If the uterus does not contract promptly the organ is stimulated by rubbing, kneading, compression, hot douches, and, if need be, by the faradic current.

Subcutaneous administration of ergot may also be called into requisition. Irrigation of the abdominal cavity is not necessary. Blood and amniotic fluid, both of which being aseptic fluids, are removed by sponging. As soon as the uterus contracts it is returned into the

abdominal cavity, and if it can be done the omentum should be drawn over the line of suturing.

Suturing of Abdominal Incision.—Owing to the thinness of the abdominal wall great care must be exercised in closing the external incision in order to prevent later the formation of a ventral hernia. This remote complication occurred in one of my cases. I am now inclined to advise in such cases Edebohls' method of suturing. This consists of a row of subcutaneous sutures of silkworm-gut which include everything but the skin, and are buried by a second row of superficial sutures. Silkworm-gut is not absorbed, but as it gives rise to but little irritation it readily becomes encysted. The dressing and after-treatment are the same as in cœliotomy for abdominal tumors.

I will report in brief the two cases of laparo-hysterotomy in parturient women that have come under my own care.

CASE I.—Patient, twenty-four years of age, German parentage, born in this country. First child delivered by version and craniotomy two years before her second pregnancy. The attending physicians made a careful examination of the pelvis and found it flattened and contracted to such an extent that they gave it as their opinion that she could never be delivered of a mature living child through the normal passage. The delivery was followed by thrombo-phlebitis and septic infection, which nearly proved fatal, and only yielded to thorough intra-uterine antiseptic irrigations. When she became pregnant the second time, her attending physician, Dr. Wenzel, advised her to enter the Milwaukee Hospital a few days before the expected labor, for the purpose of making the necessary preparations for a laparo-hysterotomy. This advice was eagerly accepted. Labor commenced 6.30 Christmas morning, 1890. The labor pains were regular and strong. The membranes ruptured at 8 A.M. As, in spite of frequent and violent expulsive pains, the head had not entered the pelvis at 11 A.M., the operation was performed in the manner described above. The record states that the child was outside of the uterus in one minute after the operation commenced, and in ten minutes later the patient was put to bed. The hemorrhage was profuse for a moment, but was arrested by the pressure of the body of the child. The placenta was attached near to the uterine wound, and was removed without difficulty. A large piece of membrane was removed separately. During the suturing of the wound the hemorrhage was controlled completely by the elastic constrictor. The child weighed ten and a half pounds. With the exception of a slight post-partum temperature the mother made a good recovery. Abdominal incision healed by primary intention. Mother and child living and in good health at the present time.

CASE II.—Woman, twenty-eight years old, native of Munich, where she resided until one year ago. Married four years. First became pregnant three years ago. After being in labor for two days a forceps delivery was attempted, but failed. An assistant of Professor Winckel was called in, who performed craniotomy. He informed the patient at that time that in the event she should become pregnant again, premature labor should be induced not beyond the thirtieth week, as the pelvis was not sufficiently large to permit the delivery of a full-grown living child.

Soon after coming to Chicago she became pregnant a second time, and allowed gestation to progress to full term. She was attended by Dr. Broell, attending obstetrician to St. Joseph's Hospital, who, upon examination, corroborated the statement previously made to her, that the pelvic capacity was such as to render the passage of the child impossible without resort to a mutilating operation on the child. She had been in labor for fifteen hours when she was admitted into St. Joseph's Hospital, October 1, 1892. Although the labor pains had been regular and strong, the head had not entered the pelvis. The patient was prepared at once for the operation. The abdominal wall in the middle line was exceedingly thin. The operation was performed very quickly, the patient being under the influence of chloroform, and a large living child delivered. The placenta was nearly separated as soon as the uterus was brought out from the abdominal incision. The uterus contracted firmly immediately after the delivery of the child. The uterus was constricted below the wound as soon as it was brought out of the abdomen, and the amount of blood lost during the entire operation did not exceed that of a normal delivery. The patient never had an ache or pain, and left the hospital in less than three weeks after the operation. Mother and child remain well at the present time.

REMARKS.—In both of these cases hemorrhage was completely arrested by the sutures. No oozing occurred from the needle punctures, as in both instances the last row of sutures was made with fine catgut and an ordinary sewing needle. All of the sutures are absorbed except those of the third row, which become encysted between the uterine and peritoneal cavities. It is advisable to use as many absorbable sutures as possible, but for the third row a material should be used which can be relied upon in maintaining approximation between the inverted serous surfaces for a sufficient length of time. My experience with these two cases has satisfied me that laparo-hysterotomy can be done on the parturient woman with as small a maternal mortality as now attends ovariectomy, and that unless the uterus itself is the seat of a removable life-threatening disease a hysterectomy is absolutely contra-indicated. The time is at hand when gynecologists must, in consonance with modern surgical teachings and practice, mitigate the *furor operativus* and resort more and more to conservative instead of mutilating operations. The generative organs of the female should constitute no exception to the golden rule, never to sacrifice an organ unless it is the seat of an otherwise incurable disease.

Laparo-hysterotomy for the Removal of Uterine Myo-fibroma.—I have already alluded to a form of myo-fibroma as another indication for laparo-hysterotomy. The removal of the uterine appendages and hysterectomy in the treatment of myo-fibroma are mutilating operations, and should be reserved for cases in which there is no other alternative. I wish to speak in this connection of laparo-hysterotomy as a valuable surgical resource in the treatment of myo-fibroma of considerable size in young women, located within or near the uterine cavity. I will premise

my remarks by the report of a case that has recently come under my observation.

CASE III.—The patient was a married woman, thirty-eight years of age, who had borne three children, the youngest being eight years of age. She dates her illness back seven years, but was not aware of its nature until recently. For the last six years menstruation has been profuse, and at times painful. She was admitted into St. Joseph's Hospital November 23, 1892, and the operation was performed a week later. Patient was somewhat anæmic, otherwise her health was not impaired. On examination a hard, smooth tumor was found in the lower part of the abdomen, reaching upward as far as the umbilicus. Vaginal examination revealed a condition which very much resembled the first stage of labor. The os uteri was found high up, widely dilated, and occupied by a smooth, hard tumor, which might have been very easily mistaken for a foetal head. Bi-manual examination satisfied me that the tumor was intra-uterine and single. Owing to the high position of the uterus and size of the tumor, I regarded a vaginal operation as uncertain and dangerous. I determined, if possible, to save the uterus and appendages, and to remove the tumor by laparo-hysterotomy. On opening the abdomen it was found that the tumor occupied the lower left and posterior part of the uterus. I incised the uterus in the median line from a point a little below the cornua to within two inches of the cervix. I had to cut through nearly the entire thickness of the muscular wall before the tumor was reached. The bleeding was moderate and was readily controlled by the use of hæmostatic forceps. As soon as the tumor was reached the work of enucleation commenced. At a number of points I had to cut strong bands of connective tissue, which seemed to extend from the uterus into the substance of the tumor. When the lower part of the tumor was reached it was discovered that on the side toward the uterine cavity, at a point a little above the cervix, the enucleated part was covered by a patch of mucous membrane. Considerable hemorrhage attended and followed the enucleation, which was arrested by packing with a long strip of iodoform gauze. A uterine sound was now introduced from below, and the mucous membrane of the uterine cavity incised upon it the whole length of the bed of the tumor, and the end of the gauze tampon brought down into the vagina. The uterine incision was closed in the manner described before, and the sutures arrested the hemorrhage completely. The abdominal incision was closed in the usual manner. The tumor weighed four pounds. Not a single unfavorable symptom followed the operation. On the fifth day the tampon was removed, the vagina irrigated with a weak solution of corrosive sublimate, and loosely packed with iodoform gauze, which was allowed to remain three or four days.

The patient left the hospital at the end of the fourth week, and has remained in excellent health since. Menstruation has been normal in frequency and quantity since the operation.

It appears to me that in such cases laparo-hysterotomy is the ideal operation, and should take the place of oöphorectomy, hysterectomy, and vaginal removal by *morcellement*. In the non-pregnant uterus the tissues are much firmer and less vascular, and the incision has to be made almost exclusively with the knife. The knife should be laid aside as

soon as the tumor is reached, when enucleation is effected with the fingers, curved, blunt-pointed scissors, or a Kocher's director. The hemorrhage from the bed of the tumor can be controlled best by the antiseptic tampon, which must extend into the vagina, serving at the same time the useful purpose of an efficient capillary drain. The mucous membrane was incised the whole length of the bed of the tumor for the purpose of securing free drainage and to facilitate the removal of the tampon. The hemorrhage from the uterine incision can be readily arrested by suturing.

I beg to submit for further consideration the following

CONCLUSIONS.

1. Laparo-hysterotomy is justifiable when delivery through the normal passage is impossible without mutilation of the living child.

2. It is absolutely indicated where the conjugata vera is less than two and a half inches, when obstruction is due to fixed pelvic tumors and advanced malignant disease of the cervix.

3. Mutilating operations on a living child for the purpose of effecting delivery are no longer legitimate obstetric procedures, as laparo-hysterotomy and symphysiotomy are life-saving operations for both mother and child.

4. Hysterectomy after laparo-hysterotomy is only justifiable if the uterus itself is the seat of a life-threatening removable disease.

5. Elastic constriction as a hæmostatic measure should not be resorted to in laparo-hysterotomy before the delivery of the child.

6. The uterine incision should be enlarged to the requisite extent by tearing for the purpose of diminishing hemorrhage.

7. The visceral wound should be closed by four rows of sutures applied in such a manner as to absolutely arrest the hemorrhage and completely separate the uterine from the peritoneal cavity.

8. Laparo-hysterotomy is also indicated in the operative treatment of single, large myo-fibroma of the uterus in young women when the tumor is located within or near the uterine cavity.

9. In such cases the uterine incision should be closed in the same manner as in operations on the pregnant uterus, and the bed of the tumor should be packed with iodoform gauze, which is brought through the cervix into the vagina, thus serving the double purpose as a hæmostatic tampon and capillary drain.

HYSTERICAL TREMOR AND HYSTERICAL ANOREXIA
(ANOREXIA NERVOSA) OF A SEVERE TYPE.

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PHYSICIAN TO THE PHILADELPHIA HOSPITAL, TO THE METHODIST EPISCOPAL HOSPITAL, TO ST. CLEMENT'S HOSPITAL FOR EPILEPTICS, AND TO THE HOME FOR CRIPPLED CHILDREN.

THE history of hysterical tremor is brief. The literature of hysteria, says one of the latest writers, presents an almost complete poverty concerning tremor. Another speaks of tremor as a "frequent accident, and too little studied, of the grand neurosis." Charcot, in a recent lecture, refers pointedly to the neglect in literature of this symptom, "which seems, nevertheless, destined, in proportion as it is more studied, to have a more extensive development." Gilles de la Tourette, whose recent treatise on hysteria represents the French school, says that among the permanent stigmata there is none whose history is more recent than that of hysterical tremor. Moreover, the literature is almost exclusively French. When we have enumerated a few papers, and these by French authors, we have practically surveyed the field.

The writers whose names are especially identified with this subject are Rendu,¹ Pitres,² and Dutil.³ Before them a few scattered references, and the reports of a few isolated cases, are found. These, beginning with a distinct reference to tremor by Charles Lepois (Carolus Piso) in 1618, are collected and analyzed by Dutil, who is closely followed by Gilles de la Tourette. Briquet, in his classical work on hysteria, makes but a brief allusion to tremor; he attributes it to the emotions, and says erroneously that it is always a passing symptom. Homolle's case,⁴ as recent as 1879, was about the earliest reported. It occurred in a woman who had other hysterical stigmata. It was a rhythmical tremor, and came after a convulsion. Chambard⁵ reported in 1881 a typical case, in which the first attack occurred at eight years of age; it was caused by a fright, and was at first limited to the arm, but later involved the leg. Perret,⁶ ten years later, recorded a case of tremor in a girl aged eleven years. He calls it very rare in children. It began also after a fright. Perret says that this important subject is not mentioned in special treatises on the diseases of children—a statement which is easily confirmed. His patient

¹ Note sur le Tremblement Hystérique et ses Variétés. Bull. et Mém. de la Soc. Méd. des Hôp. de Paris, tom. vi., 1889.

² Des Tremblements Hystériques. Le Progrès Méd., 14 et 21 Sept., 1889.

³ Contribution à l'Etude clinique des Tremblements Hystériques. Nouv. Iconog. de la Salpêtrière, tom. iii., 1890, p. 27.

⁴ Hémianesthésie Hystérique Anomale, avec contracture et tremblement du membre inférieur. Le Prog. Méd., 5 Juillet, 1879, p. 517.

⁵ Hémichorée et Hémî-Tremblement Hystériques. L'Encéphale, 1881, p. 114.

⁶ Tremblement Hystérique chez les Enfants. Abstract in Journ. de Méd. et Chirurg. prat., 1891, p. 669.

had interesting stigmata for her age, such as modifications of general sensibility, hysterogenous zones and points, over the ovary for instance; and concentric narrowing of the visual fields with monocular polyopia. The tremor was most marked in the arms; it was present during repose, but it was much exaggerated by voluntary movement. During repose it resembled the tremor of alcoholism or of Basedow's disease. Ormerod,¹ in 1887, presented a case to the Medical Society of London. The patient was a woman, aged twenty-nine, a widow. She had a tremor of the hands, and tonic contractures of the flexors of the fingers and toes. The tremor developed after a fit (a common cause according to Dutil), and had existed for more than six months. It had somewhat the appearance of paralysis agitans. Commenting on this case, Hughlings Jackson wisely said that rhythmical tremors without obvious cause are often hysterical.

Outside of France, the best description of the tremor of hysteria has been given by Mitchell.² He speaks of the importance of the diagnosis of tremor, "when a spinal malady is painted on a background of hysteria." He describes a case, evidently of pseudo-sclerosis like Westphal's (to be referred to later). The patient had defect in color-vision and other stigmata. The tremor was "intentional," and simulated closely the tremor of insular sclerosis, to which disease the observer was inclined to ascribe it. The patient could not thread a needle, nor feed herself, nor carry a tumbler of water to her mouth without violent agitation, but the tremor was absent during repose. In his original lectures, Charcot made but an incidental mention of tremor in hysteria.³

To Rendu and to Pitres, whose distinct but almost contemporaneous essays appeared in 1888, belong the credit of having first presented this subject in a systematic way. Rendu showed that there are several types of hysterical tremor, and that they simulate especially insular sclerosis on the one hand and paralysis agitans on the other. Pitres also emphasized the fact that hysterical tremor may present wholly dissimilar forms; that it may be localized or general, permanent or intermittent, slow or rapid, and, what is definitive, that it is not always a homogeneous or identical tremor, but that it presents various types, all, however, dependent upon the same primordial cause. This latter feature, so in harmony with the protean character of hysteria, is, as we shall see later, of special significance, from the standpoint of diagnosis.

The most complete study of the subject is the thesis of Dutil,⁴ who gives in detail the natural history, classification and diagnosis of this

¹ Brit. Med. Journ., December, 1887, p. 1216.

² Lectures on Diseases of the Nervous System, especially in Women. Philadelphia, 1885, p. 114.

³ Leçons sur les Mal. du Syst. Nerv., tom. iii., p. 212. Paris, 1887.

⁴ Contribution à l'Étude clinique des Tremblements Hystériques. Paris, 1891. Printed also in the Nouv. Iconographie de la Salpêtrière, 1 et 2, 1890; 2 et 3, 1891.

symptom. He is followed by Gilles de la Tourette,¹ who devotes large space to the subject in his recent exhaustive treatise, and again by Charcot,² who, in a clinical lecture, emphasizes and illustrates the importance of this study. It is thus seen with what interest the French neurologists regard the tremors of hysteria, and with what thoroughness they have described them.

I intend in this paper to emphasize the importance of the study of hysterical tremors by a review of the data for a differential diagnosis of them from tremors due to organic disease, and to further illustrate the subject by the report of a rare and interesting case. But first it will be necessary to state briefly their causes and clinical features.

CAUSES.—These tremors are sometimes gradual, but they are more often sudden in their onset. There are three chief causes: trauma, fright or moral shock, and convulsion. The tremors to which trauma directly gives origin begin now to be ascribed to their true predisposing cause, hysteria. "It is certain," says Pitres, "that most of the tremors which surgeons have described as reflex belong to the grand family of hysterotraumatic accidents." This subject has special significance in these days of "traumatic neuroses" and railway spines, which have received such a development at the hands of Oppenheim, and some German writers especially. However much we may incline to ascribe to French writers exaggerated views of the rôle of hysteria, it is certain that we must hesitate to follow on the witness stand some of our American and English experts, until they at least endeavor more faithfully than in the past to eliminate the diagnosis of hysteria. Any mere physiologico-anatomical explanation of the mechanism of tremor following trauma, falls to the ground in the failure of its author to eliminate all possible hysterical stigmata. It is not enough to ignore them; they must be proved not to exist.

Fright or moral shock is a not infrequent cause of tremor. Both Chambard and Perrot's cases in children occurred after a fright. I referred directly to this subject in a paper written some years ago,³ calling attention to tremor as a possible effect of great fear, anger, or kindred passion; and quoted Darwin's⁴ opinion that in the lower animals, as in the felines and serpents, so much nerve-force is liberated in some excited states of the brain, that muscular action, such as vibrations and other rhythmical motions, are inevitable.

Convulsion is the most common cause of hysterical tremor as observed in France. It preceded the onset of the tremor in Ormerod's case. Sometimes the tremor comes without apparent cause.

¹ *Traité clinique et thérapeutique de l'Hystérie*, etc. Paris, 1891.

² *Des Tremblements Hystériques*. *Clinique des Mal. du Syst. Nerv.*, 1892, p. 46.

³ *Hysteria: A Study in Psychology*. *Journ. of Nerv. and Mental Dis.*, vol. x., No. 4, October, 1883.

⁴ *Expression of the Emotions in Animals*.

CLINICAL FEATURES.—Hysterical tremor may be partial or general. It may be limited to one arm; or it may be of the hemiplegic or paraplegic type; or it may be general, involving even the trunk and neck-muscles. When hemiplegic it has been transferred, in some cases, from one side to the other, under the influence of magnets and other hypnotic agents. When paraplegic, it resembles closely the so-called "spinal epilepsy" of Brown-Séquard, especially if accompanied with contractures.

The duration varies. Some cases persist for months, even years; sometimes the tremor comes in accesses after convulsions, lasting then for some moments, hours, or days. It should always be looked for at such times; as it is not apt to be by most practitioners, who dismiss hysteria, when they recognize it, with contempt. Its very long duration is attested by more than one observer. Gilles de la Tourette, as we have said, places it among the permanent stigmata of hysteria—an important decision, because this permanence, more than any other feature, causes it to resemble organic disease. His position is confirmed by the undoubted tendency of tremor to recurrence. In my case it existed in a most aggravated form for many months.

The intensity varies. Sometimes it is very slight; but, again, it may be so great as to interfere with walking, with writing, with the patient feeding him- or herself, and, in fact, with almost every voluntary motion. Commonly, the tremor is increased by voluntary motion; but it may persist during repose.

These tremors have a rhythm; but the rapidity and extent of the oscillations vary in different cases. Hence they are polymorphous, and, as the French insist, admit of classification. My own original observation rather confirms these teachings, to the extent at least that in this one case the rhythm was constant, *i. e.*, always presented a definite "type," as noted by the rate of the tremor on the tracings (*q. v.*). I have been led, however, by studying the very few papers extant to think that all cases do not present this constancy of type; that some cases, in fact, vary in type, *i. e.*, in the frequency and excursion of the rhythm. Hence it would be difficult to admit of a classification of *constant types*; we may, however, admit of a classification if we recognize fully that the various types may occur in the *same* patient at different times. But this is not what I understand the French observers to mean; their claim seems rather to be that one patient presents one type, another presents another. The tendency of French clinicians in all fields, as we know, is to make clinical types and to classify. On the other hand, it is rather the characteristic of hysterical symptoms to be variable, or inconstant, and tremor, probably, does not depart from this rule.

Mitchell¹ says of hysterical tremor, that it may begin as fine in rhythm,

¹ *Op. cit.*

and increase under excitement, or the sense of being watched, into a coarser, wider rhythm. Perret makes a similar observation on his case: during repose the tremor resembled that of alcoholism or Basedow's disease, but its amplitude was much increased on voluntary motion. If persistency of type is always found in the same patient it adds to the difficulty of diagnosis, whereas variation of type in the same patient would be more in accord with the protean nature of the disease, and would make it easier of recognition.

Several schemes of classification have been proposed. Rendu made two divisions: first, those tremors simulating insular sclerosis; and, second, those simulating paralysis agitans. Dutil divides these tremors according to the oscillations per second. He makes three groups:

1. Oscillations rapid or vibratory (8-12 per second).
2. Medium rhythm ($5\frac{1}{2}$ - $7\frac{1}{2}$ per second).
3. Oscillations slow (4- $5\frac{1}{2}$ per second).

Among the last two groups some tremors appear only on voluntary motion; others, although existing during repose, are augmented by voluntary motion. Dutil thinks it convenient to group these apart as "intentional" tremors.

Charcot insists upon the varieties of hysterical tremors. It is an error, he says, to consider this tremor as a unit; there are a certain number of distinct types. He follows Dutil's classification almost exactly, and claims that every variety of non-hysterical tremor has its "sosie," or twin, in hysteria proper.

The variety usually recognized as the "type Rendu" is probably the most common, and the most important from the clinical standpoint. In it the tremor may, or may not, persist during repose, but it is exaggerated or provoked by intentional movements, the vibrations not being increased in frequency but only in amplitude. This type was presented by my own case, as well as by a number of those reported by others. In my patient the movements became irregular in the legs, as shown by the tracings, but this irregularity, caused by jerking movements, must not be confounded with tremor, which has the same rhythm in the foot as in the hand.

DIAGNOSIS.—It is probable that none of the phenomena of hysteria, unless it be some of the paralyzes, more closely resemble the symptoms of organic disease, and are therefore more difficult to be recognized, than tremor. "It is in this fact," says Dutil, "that is found the explanation of those almost miraculous cures of paralysis agitans obtained with a simple play of mirrors; of sclerosis en plaques without plaques of sclerosis." The importance of this study can be fully appreciated only when it is remembered that the diseases which tremor simulates are among the most hopeless in nervous pathology, such as paralysis agitans and insular scleriosis; or are the subjects of litigation in our courts of law, such as

the so-called traumatic neuroses; or finally, are the products of poisons, taken in the arts or in self-indulgence, such as mercury and alcohol. Hence the study of diagnosis must be supreme yet for a long while, until at least such an array of clinical facts will have been obtained as will supply some criteria to which successful appeal can be had in doubtful cases. I shall consider the subject in brief paragraphs, devoted *seriatim* to these several diseases.

The tremor of paralysis agitans is said to be closely simulated by some tremors of hysteria. In it the rhythm is slow, and persists during repose, not being exaggerated by voluntary movements. This form, there is reason to believe, has misled some competent observers, who have made extraordinary claims of having cured cases of shaking palsy. Rendu's paper was inspired by the report of a case of Luy's, which the latter claimed to be a case of paralysis agitans cured by rotating mirrors. This case was caused by trauma, and began with tremor in the hands, headache, and general weakness. After a while the disease suddenly grew worse; pains in the loins came on, and the gait became impaired. The speech was embarrassed, being monotonous and drawling. The face was immobile, the eyebrows elevated. The tremor was localized in the hands, except in the upright position when the trunk was involved; "when one placed a hand upon the patient's shoulder he felt under the hand a general tremor of the whole body." The oscillations were slow and rhythmical as in paralysis agitans. On voluntary movement the tremor augmented notably in amplitude; if the patient attempted to lift a glass of water to his lips the tremor was increased, and interfered with the act. There was no nystagmus; nor were any hysterical symptoms noted. This patient was treated with revolving mirrors, and after a mild hypnotic sleep, and some suggestion, got practically well. Joffroy cast doubt upon the correctness of the diagnosis of the case, and it is significant that the disease had been diagnosed by equally eminent Paris neurologists as paralysis agitans on the one hand, and insular sclerosis on the other. I give the details of the case because they illustrate practically many essential points. Thus the tremor *was* much exaggerated on voluntary movement, although it persisted during repose. This is the characteristic "type Rendu" of hysterical tremor, and is unlike either paralysis agitans or insular sclerosis. Again, opinions had differed about the diagnosis. This would be extremely improbable in the case of either of these two organic diseases, which are not difficult to recognize. This disagreement suggests at once something *bizarre* about the case. Finally, the fact that the case was cured by hypnotism is enough to convince most neurologists (those at least who dwell outside of France) that the disease could not have been either paralysis agitans or sclerosis en plaques. It must have been a neurosis.

From my own observations I conclude that the disease most simulated

by hysterical tremor is insular sclerosis, or sclerosis en plaques. The points of this resemblance are as follows: First, the character of the tremor. In insular sclerosis the tremor is excited, and much exaggerated by voluntary motion. The movement of such a patient attempting to carry a tumblerful of water to his lips is characteristic. This movement is really not so much a tremor as a jerky to-and-fro motion. During repose, however, the tremor is almost, if not quite, absent. Second: The speech is often drawling, monotonous, or embarrassed. Third: The mental faculties are seldom involved, but the patient is often emotional. Fourth: The age coincides with that in which hysterical tremor is common; especially in women—from twenty to forty years. The points of contrast, however, are equally marked and definitive. They are as follows: First: The tremor most common in hysteria, that known as the “type Rendu,” is persistent and very evident during repose. Even when the patient sits up it is much exaggerated, and imparts a sense of general tremor to the hand of the observer when he presses it upon the patient’s shoulder. While it is much exaggerated by voluntary movements, and often is marked by waves of exacerbation passing over the patient’s frame, it does not lose its essentially rhythmical tremulous character, and become as jerky and incoördinate as in insular sclerosis. This fact is confirmed by Charcot, who says that while the amplitude varies the rhythm does not. It is also much increased usually by simply watching the patient—a most significant fact. Second: While the speech may be affected, especially in typical hysterical ways, as aphonia, the drawling, stammering speech of sclerosis is not truly imitated. It is but just to say that this statement is not exactly in accord with some French observers. Third: The mental faculties exhibit hysterical perversions and lacunæ which are not common, in my observation, in insular sclerosis. Fourth: There are no pupil-changes, nor nystagmus. Rendu says that nystagmus has never been noted in hysterical tremor. Fifth: Hysterical stigmata can always be elicited, as a rule, by an expert examiner. These points of comparison and contrast are drawn from my own observation, and are confirmed by the case here reported. I think these deductions are almost universally applicable, because, while not denying the various types of hysterical tremor of Dutil and Charcot, I am strongly inclined to believe that this particular “type Rendu,” as seen in my case, and in many others, is the most common of the grave and persistent varieties of the disease. It was the type seen in the cases of Luys, of Mitchell, and in a still more remarkable extent, in the two cases of Westphal. The last writer¹ describes two cases of tremor, the more remarkable because the autopsies alone corrected the error of diagnosis. These two patients had had spastic paralysis for some years, as in insular sclerosis. They had rhythmical

¹ Arch. f. Psych. u. Nervenk., 1883. (Abstracted by Rendu.)

oscillations of the neck, interrupted by spasmodic contractures. The gait was tremulous and interfered with by shocks. The patients could not stand without their limbs being agitated with wide oscillations. Passive movements met with great resistance; active movements caused tremor in proportion to their extent. In the upper limbs there was paresis; no tremor during repose; but on voluntary movement oscillations occurred. One had tremor of the muscles of the face during speech. There was no nystagmus. These patients had many hysterical symptoms—as apoplectiform attacks, hemiplegia without involvement of the face; other fugacious symptoms, as localized motor and sensory paralyses. Death occurred from extrinsic causes. Westphal secured an autopsy in each of these cases. These autopsies, made with the greatest care, were absolutely negative. In brain and cord no evidence of sclerosis in plaques was observed. The nerves were healthy. Westphal concludes: “There exists a general neurosis which may be called pseudo-sclerosis, and which can be distinguished from true sclerosis in plaques neither by its symptoms nor by its progress.” This pseudo-sclerosis of Westphal has been relegated justly by French writers almost unanimously to the catalogue of hysterical tremors. The accuracy of his statement that the affection cannot be distinguished from true insular sclerosis is more than doubtful. Rendu also describes two cases, in one of which he had made a diagnosis of insular sclerosis. In these cases some of the ordinary stigmata of hysteria were always present, as apoplectiform and epileptiform attacks, evanescent paralyses, and sensory changes, as anæsthesia, etc. “It follows from these facts,” says Rendu, “that in some cases, less rare probably than is supposed, hysteria may show itself clinically by a generalized tremor, resembling that of sclerosis en plaques.” “The error is the more easy to be made as the cerebral symptoms of sclerosis are represented, and as the troubles of intelligence and of speech are closely analogous in the two cases.” Finally, he claims that the character of the tremor does not constitute a certain criterion.

From the practical standpoint the recognition of hysterical tremor due to trauma is of the utmost importance. Accidents by rail and by machinery have become so common, and in consequence litigation over damages is so frequent, that every subject connected with such accidents is bound to be tested with the most rigid scrutiny. The subject is one of peculiar difficulty, and can be treated here but briefly, and only for the purpose of emphasizing what has been said already, *i. e.*, that in cases of tremor hysteria must be recognized on the one hand, or eliminated on the other, as the case may be, before testimony can be regarded as thoroughly scientific. It is now a too well-recognized fact that hysterical tremor is frequently caused by trauma to be ignored. Oppenheim, and those who blindly follow him in this country, seek to disguise old facts under new terms, as “traumatic neuroses,” etc., but

some at least of their writing does not stand an exact criticism. Charcot, who notes that this tremor is frequently referred to in recent reported cases of "traumatic neuroses," says that this "ought to be included in the history of hysteria, and to be recognized more frequently in men." This opinion is shared by Gilles de la Tourette. Even Oppenheim,¹ in his description of the tremor following concussion, emphasizes its hysteroidal character. "These tremors," he says, "are increased when the patient is watched by the physician, showing the mental causation. . . . The fact that these lessen when the attention is withdrawn from them, or during rest, is another matter suggesting simulation. I have occasionally seen tremors which closely resembled those of sclerosis. The intimate relation of these shakings to the mental state of the person afford differential points." The hysterical character of the symptom could not be more clearly indicated. Clinically, this tremor following trauma, cannot be distinguished from the tremor of hysteria, while it is identified with the latter usually by well-known stigmata.

The toxic hysterias claim our attention here for a moment. Tremor is a well-known evidence of various toxæmias, specially of alcohol, lead, and mercury. It is not always easy, however, to eliminate from these cases the etiological factor of hysteria. These toxic hysterias, as, for instance, lead hysteria, present some difficult problems. It is common to attribute all the patient's nerve symptoms to the poison from which he suffers. But the problem often is: What is the relation of hysteria to the manifestations attributed to the poison? Few persons in this country can have failed to observe hysterical symptoms, often grave, in chronic alcoholics. The same class of symptoms may be seen occasionally in cases of poisoning by lead and mercury. Pitres gives an interesting case of hysterical tremor after delirium tremens. The man had other hysterical symptoms, and his tremor was cured with a magnet. The syndrome hemiplegia and hemi-anæsthesia in lead-poisoning, is, according to Charcot, nearly always hysterical. Letulle² has written a long paper on the neuropathic manifestations of an hysterical nature supervening in the course of chronic mercurial poisoning. He found hemi-anæsthesia and hemiplegia coextensive; apoplectiform attacks of an hysterical kind; circumscribed contractures; and hemi-tremor, post-hemiplegic and rapidly cured. Finally, he found remarkable transfer phenomena: passing of a hemi-tremor from one side to the other, and passing of dyschromatopsia from one eye to the other under the influence of a magnet. Letulle says, truly, that if these were not mercurial cases no one would hesitate to describe them as male hysterics. This tremor of mercury has been stopped by faradism; or by causing the patient to

¹ Quoted by Clevenger. "Spinal Concussion."

² De l'Hystérie Mercurielle. Bull. et Mém. de la Soc. Méd. des Hôp. de Paris, tom. iv., 1887, p. 370

squat and walk in this position, although when erect he could not walk for the tremor (type Rendu). The fact seems to be that the metallic poisons, as well as alcohol, can excite hysterical symptoms in predisposed persons; and the fact of alcohol being a well-known hysterogenous poison is a presumptive proof of the same power in lead and mercury, and especially with reference to tremor. The whole subject needs further investigation.

The paraplegic type of hysterical tremor may closely simulate the so-called spinal epilepsy of Brown-Séquard due to organic cord disease. The resemblance is increased by hysterical contractures and hysterical dysuria. The rhythmical reflexes, or clonus of organic cord disease are, however, excited, as a rule, only by putting the muscles in tension. Volition has not so much to do with them as this state of tension, even artificially produced; for instance, resting the balls of the toes on the floor, with the heels elevated. Attention, or the sense of being watched, has no influence. The movement is entirely involuntary and organic. The presence or absence of hysterical signs also avails for diagnosis.

The tremor of hysteria is said to resemble sometimes that of Basedow's disease, and also that of general paresis; but in both these affections other and characteristic symptoms would determine the diagnosis.

The case which I have to report is a rare one, at least in this country, where the grave forms of hysteria are either not as common, or not as carefully observed, as in Europe. It is of special importance, because it not only simulated an incurable organic disease, but it directly threatened the life of the patient. It presented a most inveterate example of the "type Rendu" of hysterical tremor, but this was associated with an obstinate anorexia and vomiting of food, which had brought the patient almost to the last stages of starvation.

L. E., female, aged twenty-six; residence in a small farm-house in one of the interior counties of Pennsylvania. The patient's history is uneventful. She is a member of the religious sect known as Mennonites, whose ways of life are very simple. A few years ago she had a slight heat-stroke—or, at least, heat-exhaustion—while doing a man's work in the hay-field on a very hot summer's day. Her father thought that she was never so strong afterward. In January, 1890, during the epidemic of "la grippe," she was taken very ill with the disease, and in March following had pneumonia. Her strength was thus greatly reduced, and from this period begins, apparently, the grave neurosis. It was called at the time nervous prostration. In two months more she was quite bed-ridden, and paralyzed in her legs. About this time her case began to attract attention, and to be talked about in the rural community quite far and wide. At one time, for some purpose, she was carried on a stretcher by six men a distance of nearly three miles. The paralysis and invalidism continued for one year (until April, 1891), when she began walking with the aid of canes, and soon improved very rapidly. It is not stated whether tremor existed during this first period of her illness. In June, 1891, she took, by mistake for Epsom salts, a large dose

of nitrate of potassium (ordinary saltpetre). This caused some pain and irritation of the stomach, but was not followed by any directly serious results. It caused great alarm, however, in the household and in the patient. She and her friends firmly believed at the time, and for a long while afterward, that the "coats" of her stomach had been destroyed, and that her kidneys had been ruined. From this begins the epoch of her most profound hysterical perversions. The mental impression, acting as a sort of auto-suggestion, was the direct cause of her beginning to reject food. This food-rejection became the most serious feature in her case. The fright was the direct exciting cause also of the most persistent tremor. These two symptoms, thus directly referable to the same cause, progressed, side by side, and constituted henceforth the chief clinical features. They persisted during the remainder of the year 1891. About Christmas another, but slight attack of influenza, induced aphonia, which henceforth persisted as an hysterical "fixture." In this state, with few and imperfect remissions, the case continued until May, 1892.

At this time I visited her at her father's house in the country—a remote farm-house. She was reduced to a skeleton, was quite bedridden, and was lying in a room on the ground floor, from which the light was kept shut out, and which was in consequence quite cold and damp. Her chief symptoms were the vomiting and the tremor.

The vomiting was as follows: While lying on her side the patient had constantly under her face and chin a large linen or muslin cloth. Her relatives kept this all the while in place, because in her movements it would become displaced. As she lay thus, she had at frequent intervals a violent retching, which, as her stomach was almost always empty, brought up only a little mucus and saliva. After taking food, which she took in very small quantities at a time, she almost immediately rejected it by a sort of regurgitation, rather than vomiting—so that it is probable that all the food did not really enter the stomach. Some food, of course, she retained, but her relatives told me that the gagging and retching movements were continued at intervals of a few seconds during her waking hours. They were worse when the patient was observed by strangers. They did not appear to be attended with nausea. Her appearance was sufficient proof that her stomach received and digested the smallest amount of food necessary for life. She was extremely emaciated. The calves of the legs, although the seats of constant tremor, were flat and without contour, as is seen in cases of progressive muscular atrophy. Her arms were similarly wasted. Her face, neck, and body were likewise reduced. The belly was scaphoid, and the parietal muscles were rather tense, and the seat of constant tremor. It was noticeable, however, that the color of the mucous membrane of the lips was good.

The tremor was as follows: It was general, that is, it involved all four limbs, and was imparted very distinctly to the hand laid upon any part of the trunk. The head and neck also vibrated. It was constant during repose, but it was increased when the patient was watched, and by voluntary movement. Even during repose waves of exacerbation, as it were, passed over the patient's body. It interfered so much with movement, and especially with walking, that the patient was practically paralyzed, although she was not really paralyzed, for she could move her legs and arms. It was rhythmic, but in the legs occasional shocks and jerks interrupted the rhythm. It was not exactly like any other tremor that I have ever seen, in this respect not agreeing with the French parallels.

It was somewhat like a prolonged or constant shivering of a person who is very cold, or who has a chill. On voluntary motion, its amplitude was increased, and it was interrupted by shocks, so that then it more resembled the tremor of insular sclerosis. It was, and had been, very persistent, for her friends told me that it began soon after the false alarm at the poisoning, and had continued therefore for almost one year. It ceased during sleep.

The violent motor agitation, with constant vomiting and the eructation, gave the patient an extraordinary and ghastly appearance.

The patient had aphonia. She made an effort to talk, but very little sound came from her larynx.

She had retention of urine, sometimes for as long as two days. This was originally caused, I think, by the belief that her kidneys had been damaged by the saltpetre; but as the evil habit became fixed, it still further confirmed this belief, both in herself and in her family.

A few days later she was removed, at her own request, to Philadelphia, where she remained for several months until she was quite cured. For most of this time she was in the Home for Crippled Children.

The following is a brief history of the case while under my immediate care in this city:

The tremor was accurately studied on tracings. In this work I was assisted by Dr. W. S. Carter, of the University of Pennsylvania. These tracings are reproduced here for illustration.

FIG. 1.



FIG. 2.

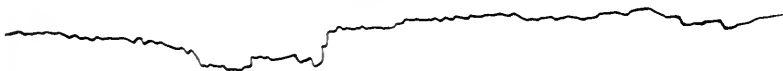


FIG. 3.



Fig. 1 shows the tremor of the hand and arm. It is steady, rhythmical and unvarying except at two places. One of these places is especially noticeable. They correspond to the waves of greater intensity, which swept over the patient's frame at intervals, especially when she was observed. They were not produced by voluntary motion, because the patient was lying at ease upon the bed while the tracings were being taken. These places, the larger one toward the left especially, show some increase in amplitude, but no change in the rhythm—a fact which corresponds exactly with the statement of Charcot. At some places a slight prolongation is seen at the point of the wave.

The number of vibrations per second was from seven to nine.

Fig. 2 precedes Fig. 1 in point of time. In it the tracing is very irregular. A true rhythm is seen, but the tracing indicates a jerky and incoördinate movement, more like that of insular sclerosis, although not so wide. These incoördinate movements really existed, because while this tracing, which was one of the first, was taken, the patient was not a little excited by the novel procedure.

Fig. 3. This tracing was taken from the foot. It is also irregular, but it is fairly accurate. The tremor in the legs and feet was continually interrupted by shocks and tonic movements of extension. These are shown in the tracing by the widely irregular line. In the long, almost straight line, the tremor is very limited in range, but of about the same rhythm as in the hand.

On the whole, these tracings (Figs. 2 and 3) more resemble those of insular sclerosis than of any other disease; and, perhaps, justify the statement that the character of the tremor alone is not sufficient to differentiate hysterical tremor. In this case the tremor was of the "type Rendu," or "intentional." It persisted during repose, and was exaggerated, but not increased in rhythm, on voluntary movement.

The patient had other hysterical stigmata during her early sojourn in the Home, as follows:

Hysterical aphonia persisted until her cure was almost complete.

Hysterical anuria, or rather retention, persisted for a short period. It lasted from twenty-four to forty-eight hours.

Very marked hysterogenous points and zones were found. One of these was in the dorsal spine; others were over the ovaries. By pressure over the ovaries the motor disorder was greatly increased; the tremor passed into a tonic rigidity of the muscles, which soon developed extreme opisthotonos, and would soon, I am sure, have excited a convulsion. But this was purposely avoided.

Sensory symptoms were never observed. Unfortunately a complete study of the fields of vision was not made.

The anorexia and vomiting continued for a few days, but never so severely as at home. They were overcome by the tact and management of a good nurse.

The history of the case in this city was one of slow but steady improvement. The patient had for a time a most annoying hysterical cough. The tremor persisted for several weeks, and was the last symptom to yield. In August the patient travelled alone to the seashore, and by October was robust, and without any sign of tremor.

The secret of success in treating the case was in removing the patient from her home, putting her under a good nurse, and using tact, encouragement, food, and good *morale*, with very little medicine.

Before closing, I desire to add a few words on the subject of anorexia and vomiting in hysteria. These symptoms, as all other hysterical symptoms, are dominated by a mental state which is often difficult to unravel. My case is interesting, because it shows a profound mental impression made by a supposed poisoning as the exciting cause. The case is interesting also because to the anorexia there was added the peculiar hysterical vomiting. These two symptoms, anorexia and vomiting, are by no means always associated. Lasègue, in his classic

essay¹ on hysterical anorexia, describes a condition of prolonged and persistent refusal of food, with preservation of a wonderful vitality, which is not necessarily, or even frequently, accompanied with vomiting. Sir William Gull² described a series of similar cases in which refusal, not vomiting, of food was the symptom. Where vomiting is added to anorexia, as in my case, an element of danger is found which does not appear to have been present in most of Lasègue's and Gull's cases. This hysterical perversion is not new, even in literature, but is not often seen in an extreme degree. I find an observation as long ago as 1789, by Naudeau,³ who describes a case of hysterical anorexia, with forced expectoration of thickened and glutinous sputa, where the patient "excited frequently the desire to vomit by the continual efforts which she made to detach from the depth of her throat viscid and tenacious matter." The history of hysterical localizations in the stomach is a lengthy and important one.

GONORRHŒAL MYOCARDITIS.

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IN spite of the fact that gonorrhœa is one of the most common diseases, our knowledge of the pathological lesions is obscure. This is due to the fact that the disease is not open to experimental investigation, and acute cases rarely come to autopsy. We know but little of the exact character of the lesions in the mucous membrane of the urethra, and the secondary lesions are still more obscure. It will not be worth while to go over the general literature with regard to the part which the organism described by Neisser, in 1881, plays in the process. Since Neisser's description of the organism our knowledge concerning it can be briefly stated as follows: It is agreed by all, or nearly all, who have studied the disease, that the gonococcus is found in the discharge from the urethra in all cases of acute gonorrhœa. The organism is characterized by morphological, staining, and cultural properties. It is easily recognized, being stained by most of the aniline colors. It is a micrococcus, and is always found in pairs or in tetrads. The single organisms are not perfectly round, but have more or less of a biscuit shape, the adjoining sides of each pair being flattened. It often presents a rather peculiar appearance in the pus cells, being crowded in one side of the cell and

¹ De l'Anorexie Hystérique. Arch. gén. de Méd., April, 1873, p. 385.

² Anorexia Nervosa. Trans. Clin. Soc., Lond., 1874, vol. vii. p. 22.

³ Sur une Maladie Nerveuse. Journ. de Méd., Chir., Pharm., etc., Juillet, 1789, p. 197.

pushing the nucleus before it. The nucleus of the cell is never invaded. Unlike the ordinary pus organisms, it is decolorized by the solution of iodine used with the Gram stain. It also differs from the pus organisms in its cultural properties. It will not grow on the ordinary culture media, and so far it has only been possible to cultivate it on solidified human blood-serum or on a mixture of this with agar-agar.

The organism has only been cultivated by a few observers, and its cultivation is attended with great difficulties. The first successful cultivation, and the first exact study of the inflammations caused by the organism were made by Bumm. Bumm succeeded in growing it on human blood-serum, which he obtained from placentas. His studies of its pathogenesis were made on the conjunctiva, where he succeeded in producing a typical gonorrhœal inflammation by inoculating the mucous membrane with pure cultures of the fourth and fifth generation. According to Bumm, the action of the organism is essentially superficial; he found that when the conjunctiva was inoculated with a pure culture the first effect was the production of hyperæmia with an increase in the conjunctival secretion. The organisms attacked first the superficial layers of the epithelium, and were generally found between the epithelial cells and occasionally in the capillary bodies. On the second day after the inoculation there was a marked emigration of leucocytes from the vessels beneath. Some of the leucocytes entered into the epithelium along with the cocci, pressing aside the epithelial cells. When the epithelium is destroyed a layer of fibrino-purulent exudation is formed which contains masses of the organisms. The organisms do not enter into the connective tissue. Bumm found that the epithelium of the cornea is not invaded by the organism, which appears only to attack cylindrical epithelium or epithelium closely related to this.

Thus he found that the gonococcus does not grow in the mucous membrane of the vagina, and he considers gonorrhœa in the female to be an affection either of the urethra or of the cervix uteri. Bokhardt claims to have cultivated the organism, and studied the result of inoculation into the urethra. He injected into the healthy urethra of a man, forty-five years old, what he supposed was a pure culture of the gonococci, and obtained a characteristic discharge with a secretion containing a number of the organisms. The man was affected with an incurable nervous disorder. He died ten days after the injection from a hypostatic pneumonia. At the autopsy an intense acute inflammation of the urethra, of the bladder, and of the pelvis of the kidney was found. In the sections made from the tissues Bokhardt obtained the organisms. No one, on carefully reading the article of Bokhardt's, can fail to be convinced that the disease which he produced in the man was not gonorrhœa, but a purulent infection. It is more than probable that his cultures were not gonococci, but some of the pus organisms. They were grown on

agar-agar, and all the evidence which we have on the subject shows that the organisms do not grow on this media. Bokhardt's description of the pathological process in the urethra differs materially from that described by Bumm in the conjunctiva. Bokhardt, in sections of the urethra, found the organisms both in the epithelium and in the submucous tissue. In the deeper tissues they were found chiefly in the lymphatics, which were often completely plugged with them. The illustrations which accompany the article of Bokhardt's show that the supposed organisms which he found in the deeper layers of the tissue were not gonococci, but probably the granular plasma cells.

Although the pathology of chronic gonorrhœa in the urethra and the lesions following this have been carefully worked out by Finger and others, we have not been able to find in the literature a single case, with the exception of the case of Bokhardt's, to which we have referred, in which the lesions in acute urethral gonorrhœa, and the part which the gonococcus plays in their productions, have been studied.

The secondary affections following gonorrhœa have been more carefully investigated. These secondary infections may be briefly stated to consist in purulent inflammations of the canals and passages in both male and female, connected with the urethra, or vagina, acute swellings of the inguinal glands, acute inflammation of the joints and synovial surfaces, and pericarditis. There are two theories with regard to the pathogenesis of the secondary infections. They have been considered by some to be the result of an extension of the gonorrhœal process and an infection of remote parts with gonococci; and by others to be the result of a mixed infection, and to be due to various organisms, especially the pus organisms which have entered into the tissues from the local lesions and been carried to the various secondary foci. Gonorrhœal rheumatism is the most common of the remote secondary affections following gonorrhœa, and a great deal has been written about it.

One of the most extensive articles on the subject is that of Loeb, in the *Deutsche Arch. für klin. Med.* Different authors give different figures as to its frequency. Fournier, who has had the most extensive experience and the largest number of statistics, gives one case of joint affection to sixty-four of gonorrhœa. Besnier gives the relation of one to fifty, and Grisolle as one to thirty-five. Loeb, without giving any definite figures, thinks that the affection is much more frequent than would appear from these figures. Some authors are disposed to deny any connection at all between the rheumatism and the gonorrhœa; others think that there must be an especial predisposition to rheumatism, which is called into activity by the urethral affection. In some cases the rheumatism does not seem to be produced early in the disease. It frequently follows a torpid state of the gonorrhœa, and rarely appears before six to fourteen days from the beginning of the attack. As a

rule, most authors agree that the rheumatism is only seen when the gonorrhœal process attacks the posterior portion of the urethra. It is certainly much more frequent in men than in women. There seems to be a marked difference in the symptoms produced in gonorrhœal rheumatism, as compared with ordinary acute rheumatism. Fever may be entirely absent in gonorrhœal arthritis, and even when it is present it has not the same long duration, and it may disappear while the affection of the joint obstinately continues. In some cases, however, there may be a considerable increase of the temperature in gonorrhœal rheumatism. Its duration is longer than the ordinary rheumatism. The number and situation of the joints differ in the two cases. Generally speaking, in the gonorrhœal rheumatism fewer joints are affected than in the ordinary form. The knee-joint is one of those most frequently affected. The joints of the upper extremities are very frequently free. In Nolen's 118 cases the wrist-joint was affected twenty-six times, and in Fournier's 119 cases, only fourteen times. There is a further difference between the two affections in the result of the treatment. The gonorrhœal joint affections do not yield to the treatment with salicylates as do the ordinary forms. In a very few cases does the arthritis lead to supuration and destruction of the joints.

Affections in the peri- and endocardium are also frequently seen as a complication of gonorrhœa. They are usually seen in combination with rheumatism, but they are far less frequent in gonorrhœal rheumatism than in the other forms. Zeissl regards the comparative freedom of the peri and endocardium from infection as characteristic of gonorrhœal rheumatism. Nolan found fifteen cases in which the heart was affected in his 116 cases of gonorrhœal rheumatism, but it is probable that his figures are overdrawn. There are a number of cases reported clinically in which an affection of the peri- and endocardium has been found in gonorrhœa. Traube makes repeated mention of heart affections in gonorrhœa.

With regard to the bubos there need be no special reference. They are frequently found in gonorrhœa in both the male and female. The cultures made from the glands after removal are usually sterile.

In a number of cases organisms which have been considered to be gonococci have been found in association with these secondary lesions. Petrona claims to have found cocci in the joint affections which were similar to those found in the urethra, and he even found them in the blood in cases in which the joints were affected. Kramer also found gonococci in the joints. They were present in one of his cases, and in the other no organisms at all were found. Hahn has found cocci in gonorrhœal affections of the joints, but he does not regard them as true gonorrhœal organisms, but simply as pus organisms. He says that they are only found in cases where the process is fresh, and advancing

rapidly. Where the process is more chronic, they are not found. Haslund believes that the gonorrhoeal rheumatism is due to a specific infection from the inflamed mucous membrane, but he was not able to find the gonococci in the joints. Leistikow investigated four cases of gonorrhoeal arthritis, and found no organisms in the contents of the joints, nor in the blood of the patients. Hartley investigated a number of cases of gonorrhoeal rheumatism, in which he found typical cocci in the fluid. In a recent publication, however, he inclines to the belief that the secondary affections are due to accidental infection with other organisms. With regard to the cardiac affections in gonorrhoea, they appear to be usually either cases of pericarditis or of endocarditis. Schaedler published a case of endocarditis ulcerosa which followed a gonorrhoeal rheumatism, the rheumatism appearing three weeks after the beginning of the gonorrhoea. Eight months later symptoms on the part of the heart appeared which resulted fatally.

Glusinski describes thirty-one cases in which complications on the part of the circulation were found in the course of gonorrhoea. All of his cases were clinical. His reports a case in which organisms, apparently the gonococci, were found in the vegetations on the aortic valve, in a case of endocarditis which appeared several weeks after a gonorrhoea.

The gonococci have been found by various authors in the buboes following gonorrhoea, in the peri- and para-urethral abscesses, and in the various other local lesions. They have also been found in the tubes in cases of salpingitis following gonorrhoea. So far as we can see from this brief review of the literature, there are a number of varying opinions as to the pathogenesis of the secondary gonorrhoeal affections, some believing that they are due to a specific infection with gonococci, while others believe that they are due to an accidental infection with other organisms which enter the tissues from the local lesions in the urethra.

The following case is of much interest, not only on account of the unusual character of the lesions, but from the opportunity which was given for a close histological study of the acute process in the urethra and elsewhere. The case is from the Boston City Hospital, in the service of Dr. A. Post, to whom I am indebted for the notes of the case.

It is that of a man named W. H., admitted to the hospital September 30, 1892. Urethral discharge first noticed four weeks before admission. Ten days after the gonorrhoea was first noticed, the left knee began to swell and became painful. This condition lasted three or four days, then extended to the right knee. Since the attack he has had pain and swelling in the fingers, shoulders, and ankles. Cannot take long breath on account of pain in chest. On October 6th, the pain in chest ceased, after having lasted from entrance. Pain in right knee persists. Temperature remains normal. October 7th, he complained of much pain in chest. On examination, there was a slight increase in cardiac dulness, but no murmur or pericardial rub. October 8th, pain in chest continued and leeches were applied for its relief. October 9th, slept well, awoke at six A.M. and drank some milk. At seven, cried out as

in pain and fell out of bed. The house officer, who was summoned at once, found the patient gasping for breath and no pulse perceptible at wrist. Patient died almost immediately after being seen by house officer. Temperature during the whole course of the attack did not exceed $99\frac{1}{2}^{\circ}$. The pulse kept under 110. The respirations were accelerated. The autopsy was made twenty-eight hours afterward.

The body was of medium size, slightly built, badly nourished. The general surface cyanotic. Both knee-joints, especially the right, enlarged and gave clear fluctuation. The subcutaneous fat small in amount; muscles rather pale, somewhat diffusely stained with blood. The spleen slightly enlarged, both that and the liver free from adhesions. No adhesions in peritoneum. Peritoneal surface smooth everywhere. Diaphragm depressed on left side. Both lungs free from adhesions and compressed by distended pericardium. The posterior and lower portions of both lungs congested and œdematous. Mucous membrane of bronchi congested; vessels at root of lung free. Pericardium enormously distended. The external surface congested and covered with small hemorrhagic foci. In the pericardial cavity a large amount (about 800 c.c.) of hemorrhagic exudation, in which there are large masses of clot. Both surfaces of peritoneum covered with thick membranous masses, containing hemorrhages. The heart is firmly contracted. The aorta is very narrow. The myocardium of left ventricle is firm and of a peculiar pale waxy color, somewhat resembling amyloid. Toward the endocardium, especially about the base of the papillary muscles, the tissue has a grayish translucent, gelatinous appearance. This extends in places into the tissue of the myocardium for a considerable distance. It is especially marked toward the apex of the ventricle. In places this pallor and translucent appearance is associated with marked hemorrhagic infiltration. This condition of the myocardium is almost confined to the left ventricle. There is some evidence of it on the right side, but it is not so well marked. On the anterior inner surface of the left auricle there is an area of $2 \times 2\frac{1}{2}$ cm., where the muscular tissue is substituted by a pale opaque tissue; the centre of this soft and almost broken down. The spleen is enlarged; the follicles prominent. Both liver and kidneys show slight acute swelling. All of the follicles of both large and small intestine are enlarged and hyperæmic. In the small intestines the follicles have the character of small polypi. The Peyer's patches are enlarged, but there is no ulceration. All of the mesenteric lymph glands are slightly enlarged. The right knee-joint is greatly distended. On section, about 100 c.c. of gelatinous pus escapes. The pus is stringy and rather transparent. The muscles above the joint in the immediate neighborhood show some diffuse purulent infiltration. The synovial membrane of the joint is swollen and intensely congested. There are papillary fungoid projecting masses of granulation tissue extending into the joint, having somewhat the appearance of masses of tuberculous granulations. On section, these projecting masses have a white opaque edge, and below this the tissue is gelatinous and œdematous. The left knee joint contains a smaller amount of this material. The joint is somewhat altered, but not to the same extent as the right. There is no general glandular enlargement.

The entire mucous surface of the urethra appears to be thickened and softened. The peri-urethral tissue is thickened and dense. About four cm. from the meatus there is a slight ulceration on the surface apparently only involving the mucous membrane. The mucous surface is covered with a slight purulent exudation. Pus can be squeezed from the seminal ducts, and there is a purulent infiltration extending from here into the prostate. In each side of the prostate an extensive purulent infiltration of tissue with softening, and on the left side a distinct abscess. The seminal vessels, testicle, and epididymis show no alteration.

Microscopic examination of the pericardial exudation showed hemorrhage, large numbers of pus cells, and large epithelioid cells. No gonococci were found in this exudation. The examination of cover slips made from the urethra and from the knee-joint showed the presence of gonococci. They

were abundant in the urethra, but comparatively few were found in the joint. In both places the organisms were only in the pus cells and appeared to be identical. It is to be regretted that at the time it was not possible to make cultures from the tissues. All of the tissues were hardened in alcohol and subsequently examined.

Microscopic examination of the urethra. Sections of the gland show no lesion of the epithelium. Here and there on the surface there are adhering pus cells, some of which contain the gonococci. There is a gradual transition of the epithelium of the glands into that of the modified cylindrical epithelium of the urethra. The epithelium of the urethra is composed of numerous layers, but the cells have more the character of the cylindrical epithelium. The pigmented layer disappears and the papillæ become less prominent. Just within the urethra there is a deep crypt with several papillary projections of its wall. Here and there over the surface of this the epithelium appears to be broken through and there is an intense round-cell infiltration of the submucous tissue. There are very few pus cells mixed with the round-cell infiltration. The tissue immediately beneath the mucous membrane, along almost the entire extent of the urethra, shows a round-cell infiltration which is more or less focal, and in some places being more intense than in others. In the vessels of this tissue there are a comparatively small number of leucocytes, in places emigration is apparently taking place. The plasma cells in the tissue are very numerous, and many of them appear strikingly like cells filled with micro-organisms. There is no basement membrane, giving a sharp line of demarcation between the epithelium and the tissue beneath. In the epithelium there is a considerable number of polynuclear leucocytes among the epithelial cells. In places there are irregularities on the epithelial surface, and small depressions resulting from the softening and breaking down of the cells. Gonococci are found in relatively small numbers. They are in the epithelium, both between and in the cells, but the greater part of them are found in the pus cells, on the surface of the epithelium, and between the epithelial cells. None are found in the deepest layers of the epithelium, nor are they in any of the tissues outside of the epithelium. Nuclear figures are found in the epithelial cells in the lower layers corresponding to the place where the lesions of the surface are most marked. The gonococci were found both as masses filling up the entire cells and as single pairs. The mucous membrane throughout the urethra in all of the sections appears to be softened and exfoliated, and in places the granulation tissue is directly continuous with the surface. The sub-epithelial crypts show about the same condition as the surface of the urethra. The mucous membrane in places is entirely absent and the granulation tissue comes to the surface. The cells found in the granulation tissue are of the ordinary types: both ordinary granulation cells and those with larger nuclei. The gonococci are always most abundant where the purulent infiltration of the mucous membrane is most intense. They were found in the crypts and in the pockets of Morgagni, but in general they were less numerous here than on the surface of the urethra. Deep down in the tissues there are no lesions whatever to be made out. On sections passing through the membranous portion of the urethra near the prostate, cutting across the numerous ducts and crypts, the same condition was found as in the other portions of the urethra. In the prostatic ducts there was an intense purulent inflammation, but very few gonococci were found. In many places the epithelium was entirely destroyed. This condition extended up into the prostate, and on one side of this the tissue has entirely broken down, resulting in the formation of an abscess. No gonococci or other organisms were found in the abscess. The only other organisms found in the urethra were a few short bacilli on the mucous surface which apparently had nothing to do with the inflammation and were only accidentally present.

Sections of the heart from various places were examined after being hardened in alcohol. There is everywhere an intense pericarditis. The pericardium is universally thickened and swollen. In some places it has a thickness of 2 or 3 mm. The surface is generally smooth, but in places there

are well-marked papillary projections. There is some fibrin loosely adherent to the surface, but there is no definite fibrinous exudation. In the thickened pericardium there are numerous widely dilated bloodvessels with thin walls. It is probable that the blood found in the pericardial cavity came from the rupture of these vessels. The thickened tissue of the pericardium is loose, infiltrated with pus cells, and contains numerous large round cells, some of which enclose pus cells in their interior. There are various changes in the myocardium, which are more extensive close to the endocardium than elsewhere. In the least-marked lesions in the myocardium there appears to be simply some infiltration with pus cells along the connective-tissue septa which are thickened and swollen. In some places the lesions in the myocardium, although most intense near the endocardium, appear to extend from the pericardium and can be traced directly to this. In all of the areas where the purulent infiltration is seen there are various degrees of degeneration of the muscular fibres. In the slightest change they appear to be slightly swollen, diffusely stained, their nuclei disappear, and they frequently contain vacuoles. There is every degree of change from this up to a total necrosis of the muscular fibres, and an entire substitution of areas of purulent infiltration and necrosis for the normal tissue of the heart. There is little or no formation of granulation tissue. Some of the areas where the degeneration is most extensive involve almost the entire thickness of the ventricle, extending up to the pericardium. In such places there are large areas of necrotic tissue with a purulent infiltration extending widely into the tissue beyond the necrosis. The most pronounced lesion is found in the left auricle. In this there is a very large area of necrosis and suppuration which involves the entire thickness of the wall. Extensive hemorrhage was found in some of the necrotic foci. This was most extensive in the auricle. The gonococci are found in the sections in considerable numbers. They were most numerous in the most acute focus in the auricle. They were found also in the ventricle, but in much smaller numbers. In the pericardium very few were found. In the left auricle they were present in some of the sections in enormous numbers. In places almost every pus cell contained them. None were found in the tissue outside of the cells.

Sections of both knee-joints were examined after the tissue was hardened in alcohol. On the surface corresponding to the opaque appearance noticed at the autopsy there is an area of purulent infiltration extending only a short distance into the tissue—not more than one millimeter. In this tissue the vessels were dilated and tortuous and frequently contained numerous pus cells. In the tissue beneath there are comparatively few pus cells. Most of the cells here are large and swollen, conforming to the general type of the epithelioid cells and frequently containing large vacuoles within them. The surface of the joint is generally smooth, but in places it shows small depressions. The gonococci were found in but comparatively small numbers. They were never found deep down in the tissue, but were always either immediately on the surface or in the most superficial layers. They are most numerous where there are slight depressions and where the inflammatory process appears to be most intense. They were only found in the cells, and in their general character they agree with those found in the urethra.

When we look over this case we see that we have an acute gonorrhœa associated with remote lesions. These lesions appeared some time after the beginning of the attack of gonorrhœa, and in their general character they do not correspond with the lesions which are produced by the pus organisms. The process in the pericardium is not at all similar to any of the forms of peri- or myocarditis which are produced by other organisms. The most striking feature is the absence of any fibrinous exudation. The process consists in the production of various degenerations of tissue and necrosis with purulent infiltration, and a more or

less extensive reaction on the part of the tissue shown in the formation of granulation tissue. In the knee-joint, also, the process is a peculiar one. There is a comparatively slight extent of distinct purulent infiltration, but the main thing is a formation of granulation tissue with mucoid degeneration of the cells. The presence of this mucus coming from the cells gives to the purulent accumulation in the joint its viscid and gelatinous character. Our conception of the process in the urethra agrees almost exactly with that of the study which Bumm made on the conjunctiva. The process, as far as the bacteria are concerned, is a distinctly superficial one. There is more or less loss of the epithelium, with purulent infiltration. In the surrounding connective tissue there is an extensive formation of granulation tissue. No gonococci were found in the depths of the tissue.

As we said in the beginning, there are two opinions regarding the secondary lesions in gonorrhœa. One, that they are due to a mixed infection, probably to other organisms than the gonococci entering the system from the lesions in the urethra; the other, that they are due to a direct metastasis of the gonococci. From the examination of this case, I think there is but little doubt that the secondary lesions were produced by the gonococci, the same organism found in the urethra. Unfortunately the case is not a complete one, owing to the absence of cultures at the time of the autopsy. The organisms were only studied on the cover-slip preparations and in the sections. The sections show apparently the same organisms in the tissues as were found in the mucous membrane of the urethra. It is not possible to absolutely distinguish the gonococci from the pus organisms by their morphology alone. Streptococci are often found in pus cells arranged in pairs and resembling in almost all respects in their morphology the gonococci. They are not, however, as a rule, found in groups of four, as the gonococci frequently are. We can judge somewhat by their reaction with staining agents. All of the pus organisms retain their color after staining by the Gram method. The organisms found in this case were all decolorized. Although the pus organisms are frequently found in cells, this is not their exclusive position. In any case where they are found in the cells they will be found in the tissue also. The organisms found in this case conform with the gonococci, in that they were all decolorized by the Gram staining and were only found in the cells. Moreover, the lesions which were produced were not such as we would expect to be produced by the pus organisms or even by the pneumococci. Clinically the course of the disease, especially the absence of fever, which almost all observers have noted as characteristic of the secondary gonorrhœal affections, also speaks in favor of a gonorrhœal instead of a purulent infection.

ON SOME POINTS OF IMPORTANCE IN THE NOSOLOGY, PATHOLOGY, AND TREATMENT OF CANCERS.

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It is the purpose of this paper briefly to discuss certain points of fallacy in the current nomenclature of malignant diseases, and to suggest a more precise definition of the leading terms. These obscurities of diction, with the not infrequent use of an identical word by different authors in extremely varying senses, often involve rather serious errors in practice. Moreover, the generic designation "cancer" covers a very extensive series of lesions; and it seems to the present writer eminently desirable that the natural complexity of the subject should be as little as possible enhanced by verbal or technical ambiguities.

I. DEFINITION OF CANCER.—Cancer, or "malignant disease," is the term denoting a large group of lesions in which cells normal to the body, or having previously constituted an integral part thereof, seem to acquire autositic properties; and thenceforward flourish, at the expense of the healthy tissues with which they come in contact.

Whether the autositic theory of cancer-formation be accepted or rejected, it can hardly be disputed that the above proposition accurately summarizes the very varied phenomena of malignancy. To it the clinical and pathological features of every neoplasm properly styled "malignant" accurately conform; while each differs from all the rest in comparatively minor matters of detail. All are saliently distinguished by the exuberant proliferation of previously normal cells; by the subsequent *progressive erosion* of contiguous tissues; by the acquisition of *infective* properties, with metastatic transference of cells or cell-particles to distant parts, there continuing to grow with the same peculiarities of function, and even with the same minutiae of relative arrangement as the parent-cells. Most again exhibit, at one time or another, the phenomenon of "auto-inoculation;" much more common than is usually supposed. Many examples, some of routine occurrence, some exceptional, will be found in my recently published *Cancers and the Cancer Process*.

II. PRINCIPLES OF NATURAL CLASSIFICATION.—The primary *genera* of cancer will, on the basis of natural affinities, be referred to the functional or structural characters of the particular cell-variety whence each is derived; the secondary *species*, to modifications in the preceding, often associated with individual idiosyncrasy. Thus nine general demand recognition:

a. Epithelioma: derived from epithelial or epidermic cells, lining skin, or mucous membrane.

b. Carcinoma: from the secreting cells of acinar glands.

c. Sarcoma: from connective-tissue cell-elements.

d. Lympho-carcinoma: from the cells of the lymph glands, with other lymphoid or "adenoid" tissues.

e. Cylindroma: from the cells lining tubular gland follicles. A form special to the stomach and intestines.

f. Rodent ulcer: from the cells constituting the outer root-sheath of short hair follicles.

g. Endothelioma: the rare cancer of serous membranes.

h. Myo-sarcoma: from the nuclei of non-stripped muscle.

i. Blastoma: the cancer of foetal residua. (From *βλαστός*, germ.)

Then of species, we have acute and chronic varieties of carcinoma, the latter being almost restricted to the female mamma; ditto of sarcoma, the spindle-celled and the mixed-celled; sarcomata whereof the parenchyma has undergone mucoid degeneration (myxoma); carcinomata, or not seldom cylindromata, subjected to an analogous process of decay, thus "colloid cancer;" sarcomata, partly organized into bone, constituting osteoid sarcoma; ditto, having undergone degeneration into a yellowish-green material (chloroma); melanotic cancer; glioma. We have further to add tumors on the borderland, as it were, of cancer, and but occasionally displaying malignant features; with others, peculiarly rare and obscure. Such are "thyroid cancer;" cheloid; Kaposi's disease (*xeroderma pigmentosum*); Dühring's neoplasm (*granuloma fungoides*); rhabdo-myoma; psammoma; the plexiform sarcoma of Billroth; intra-cystic vegetations of two species, carcinomatous and sarcomatous. This arrangement is, of course, but provisional, and will eventually be found susceptible of much further curtailment, with material advantage in point of lucidity. Several of the last-mentioned lesions in particular belong properly to the congenital group.

III. SOME AMBIGUITIES IN CURRENT NOMENCLATURE, WITH THEIR PRACTICAL IMPORT.—The word "sarcoma" has acquired in medical parlance a significance almost as vague as the obsolete phrase "soft cancer;" as now employed, it designates almost any cell-mass, of uncertain starting-point—in addition to tumors arising in connective tissue. It is thus made to include examples of carcinoma, of lympho-carcinoma, of foetal "blastoma," even of endothelioma.

If we restrict it to cancer-products of the connective tissues we must first ask how these are to be recognized. The distinguishing badge of the true sarcoma is the presence in microscopic sections of embryonic spindle-shaped cells, ranged in bands. The chronic sarcoma consists wholly of this tissue; the more acute and rapidly growing tumor presents microscopically the same pathognomonic feature blended with a variable amount of round or ovoid cells or nuclei. No sarcoma, properly so entitled, is without this distinguishing mark.

The omission from text-books of tumors designated as "round-celled

sarcoma" would be a distinct gain to pathology; the cases are either examples of "mixed" sarcoma, or else fall more correctly into some other division of the cancers. It would also be advantageous to relinquish the phrase "myeloid" sarcoma. "Giant corpuscles" or "myeloids" are little fibrinous masses entangling leucocytes; they are not restricted to malignant tumors, and those which possess them do not clinically differ from ordinary spindle sarcoma. They are common to tuberculosis, to processes of absorption or of repair in bone, as well as to sarcomata; I have even found them well marked in a very vascular breast carcinoma. Their presence seems only to imply marked vascularity; it is almost needless to state that they bear no relation to the marrow.

The true sarcomata differ from carcinomata, and from the other cancerous growths of epithelium, simple or functionally modified, in that they do not infect the nearest chain of lymph glands, *per* the lymphatic vessels, but only by the blood current. In other words, whenever we find obvious lymph-gland enlargement near a true sarcoma, that is a symptom of general blood-infection, with malignant cell particles circulating throughout the body, and is concurrent with other metastatic deposits in the viscera, etc. Such is the almost universal rule; it is possible that rare exceptions may occur; but cases in proof are wanting, and I have never encountered one. In clinical experience the distinction is illustrated by the two varieties of melanotic cancer. That which attacks the integument, as first pointed out by the writer (*Lancet*, October 15, 1892), is a product of epithelium developed from the pigmented cells of the Malpighian rete. This produces very early deposit in the proximal lymph glands. On the other hand, melanotic tumors of the eyeball arise in connective-tissue structures, do not infect the glands until late, and until there are conspicuous metastases in the liver or bones. (Pemberton, *Observations on Cancer*, Part I.)

Hence springs the important practical consideration that, with a true sarcoma, the adjoining lymph glands, when not enlarged, should on no account be interfered with at a surgical operation; and that, if these have undergone increase in bulk, operative removal will be practically useless. On the other hand, with carcinomata and epitheliomata, the cardinal principle of cancer surgery, on which, more than aught else, its future improvement would seem to depend, is *the excision of all lymph glands near the primary lesion, before any palpable enlargement has taken place*. For example, when a carcinomatous mamma is removed, unless for very transient palliation, it is imperative to evacuate the contents of the adjoining axilla. Should the tumor prove sarcomatous, a fact generally apparent to the naked eye by the yellowish color and fibrillated aspect of the cut section, interference with the axilla will very needlessly enhance the gravity of the operation. The more acute forms

of carcinoma here are ashy-gray in color, pulpy in consistence; under the microscope they exhibit little acinar arrangement, except at the margins; only a promiscuous mass of roundish cells is seen; and hence the disease very frequently passes as a "round-celled sarcoma."

Another point of fallacy, of less important practical, but of some pathological, significance, is connected with malignant new-growths of epithelium (epithelioma). We occasionally read of a "columnar-celled epithelioma," as distinguished from the corresponding product of squamous cells; and the term "duct cancer" has been coined to denote cases of mammary carcinoma, in which columnar epithelium lining cysts or the wide meshes of a stroma is a predominant feature, and which therefore are supposed to arise in the columnar lining of the lactiferous ducts. Now the particular shape of an epithelial cell is a non-essential and highly variable attribute. The transitional epithelium of the bladder materially differs in outward form with the degree of distention; piles and uterine polypi are coated by squamous cells in place of the normal columnar; the lining of the bronchial tubes is readily modified by conditions of the environment. For other facts in proof, see Bland Sutton (*Dermoids*, pp. 29, 30); Shattock (*Pathological Transactions*, xiv. 209); Haycraft and Carlier's "Researches on the Cat's Trachea" (*Quarterly Journal of Microscopical Science*, February, 1890).

Hence, a differentiation of the cancer-products of epithelium, based solely upon morphological considerations, proves unsound. Epithelial cells lining a mucous surface, whatever their previous form—squamous, cubical, columnar, or transitional—generate a malignant lesion with identical microscopic and clinical features. We have no evidence that the cubical cells lining lactiferous ducts produce any special variety of carcinoma; and the appearances regarded as distinctive of "duct cancer" are commonly associated with those of ordinary scirrhus. The somewhat rare "columnar epitheliomata" of the pharyngeal region, etc., are generally traceable to a congenital source (blastoma); are often encapsuled, or blended with cysts, and present, moreover, a more favorable outlook, in respect of surgical treatment, than the infective and rapidly infiltrating epithelioma proper.

That virulent species of cancer which primarily attacks the lymph glands I much prefer to entitle "Lympho-carcinoma" than "Lympho-sarcoma," for reasons sufficiently obvious to all who are clinically familiar with its course.

It necessitates very early recognition and prompt surgical treatment, neither of which presents, as a rule, much difficulty. A suitable appreciation of its character is, however, hindered by confusion with Hodgkin's disease, a general blood disorder following exposure to cold and wet, pyrexial, and simultaneously affecting many glands; whereas the malignant disease is primarily local, of traumatic origin, non-pyrexial, always

first developed in a single organ or contiguous group thereof. Both of these widely different maladies have hitherto passed often as "Lymphadenoma," and many instances of the cancerous have been described as "round-celled sarcoma."

The two forms of melanotic cancer have been already alluded to; the epithelial source of one involves the surgical axiom of anticipatory removal of all dangerous lymph glands in the path ordinarily pursued by the infection, and peculiarly accentuates its significance. For the primary integumental lesion is always an insignificant wart or nævus, permanently eradicated with little trouble, and which, from any share it has in killing the patient, might almost as well have been left alone.

Life is destroyed by "recurrence," usually swift, in the glands, with the consequent eventual passage of particles of cancerous protoplasm into the circulation current. A spurious form of melanosis, not showing pigment, however, under the microscope, may be generated in a malignant tumor by extreme hyperæmia with extravasation, and visceral deposits of true melanotic cancer may be consecutive to some minute warty growth, previously removed and forgotten. But it is pathologically important to recognize the rule that this variety, whether epithelioid or sarcomatous, can be developed from pigmented cells only, and in regions of the body where such abound.

The term "Glioma" covers at least three distinct species of neoplasm, two of which appear in adults, while the third is peculiar to young children. Of the former, one is composed of minute spindle-shaped cells, arises from the neuroglia, and is a true sarcoma; the second, round or oval-celled, as originally pointed out by Virchow, arises in the ganglion cells, and not from the connective tissue. Both these tumors are found in the brain or spinal cord of people advanced in life. The third is restricted to the eyeball, may begin *in utero*, may attack both eyes synchronously, and is plainly of congenital origin, always developed before the thirteenth year, hence should properly be referred to the Blastoma series.

The myo-sarcomata, so far, have been reported mainly in association with the uterus, and have not been differentiated from the congenital rhabdo-myomata of the kidney, described under the same name. Microscopically, they consist of two diverse elements, predominant in different regions of the growth; one, of embryonic spindle cells indistinguishable from those of spindle sarcoma; the other, of small round "lymphoid" cells or nuclei. A typical instance is elaborately reported by Dr. David Finlay, in the *Path. Trans.*, xxxiv. 177; see also *ibid.*, viii. 287, and ix. 327. Many examples have been consecutive to an ordinary myoma of many years' duration. The fact is significant as illustrating the reversionary transition of benign neoplasms to cancer, and the variable line of demarcation between the two great classes of tumor forma-

tions, the innocent and the malignant. The same principle is more familiarly exemplified by new-growths in the female mamma, all of which, down to the most simple cyst, after the age of thirty-eight years, sooner or later become associated with the symptoms of malignancy, and for purposes of treatment, should then always be regarded as potential cancers. Many lives would be saved by timely removal of what the patient has been told is "only a cyst," before intra-cystic vegetations, carcinomatous or composed of embryonic connective tissue, have been suffered to sprout from its walls, or, what is far more dangerous, before carcinoma has attacked the gland acini imbedded in these or immediately contiguous thereto.

Considerations of space necessarily forbid discussion of remaining cancerous or quasi-cancerous lesions above tabulated. But it is impossible to omit reference to the growth of tumors which are the offspring of foetal residua, of non-obiterated remnants of one or other of the embryonic "blasts," or of degenerate foetal organs. Both clinically and pathologically, these very materially differ from the ordinary malignant developments of the "cancer age;" clinically, in generally attacking children and adolescents, as also in appearing spontaneously without discernible exciting cause; pathologically, in their tendency to cyst-formation, and in their strange admixture of the most dissimilar tissues. They cannot be classed with any malignant growth of the ordinary species. Sarcoma structure is curiously blended with that of carcinoma, both with cysts; thyroid tissue, Lieberkühn's crypts, cartilage, bone, fat, striped and non-striped muscle, ganglion cells, etc., are heterogeneously mixed. Hence, it appears necessary to place them in a division apart, which I have ventured to designate "Blastoma." This includes the "oöphoromata" of Bland Sutton (dermoid cysts of the ovary, which emit metastases, and are accompanied by various other cancerous features); renal "rhabdo-myomata," with malignant lesions in the genito-urinary tract of children; mediastinal tumors springing from the degenerate thymus; various mixed tumors in the parotid and other salivary glands, in the soft palate and pharynx; retinal glioma; many anomalous lesions about the nerve centres, etc. A more detailed analysis of these obscure forms will be found in my work above referred to. I believe that, collectively considered, their phenomena will be found to have a vital bearing upon the problem of cancer etiology in general. But whether that view meets or not with acceptance, it is clear that they must be clearly distinguished from the ordinary cancerous diseases of adult life, following well-recognized antecedents, and never developed without adequate "exciting cause."

THE DISORDERS OF THE NERVOUS SYSTEM ASSOCIATED
WITH THE CHANGE OF LIFE.

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DURING the fifth decade of a woman's life she is subject to a group of peculiar symptoms. The cessation of the function of reproduction is an event second in importance only to the death of the individual. It is not strange that the loss of this wonderful power should be accompanied by changes in the mental and emotional condition, and that the action of the entire nervous system, connected as it is with every organ of the body, should be profoundly disturbed. The women in whom the change of life occurs unaccompanied by disagreeable sensations and symptoms are in the minority. The object of this paper is to enumerate some of these symptoms, to discuss briefly their nature and origin, and to present some suggestions with reference to their prevention, amelioration, and cure.

In ancient times it was commonly believed that menstruation was, at least in part, an excretory function; that with the menstrual blood some indefinite and unknown excrementitious substances were eliminated from the body; that retention of these waste products occurred when the function of menstruation was inadequately performed; and that such retention was productive of very serious results. This idea has been gradually abandoned by most men who use their intellects and are not abnormally credulous. It is now generally recognized that the absence of menstruation is often not only attended by no unfavorable results, but, on the contrary, is an important aid to the preservation and increase of the vital forces.

It might perhaps be not unnatural to suppose that, when menstruation finally ceased at the menopause, the failure of the periodical sanguineous flow to occur would result in the presence in the vascular system of an abnormal amount of blood, and that this would give rise to important disturbances of various organs. It will subsequently be shown that this is, at least, improbable, and that on the other hand a deficiency of blood, or of certain of its more important constituents, is frequently present at this period.

It may be premised that the average woman is exceedingly neglectful of her health. Her clothing is often insufficient, and so arranged as to produce positive injury to her body. Her food is unsuitable in character, improperly prepared, taken at irregular intervals and in insufficient quantity, and not properly digested. Tea and coffee are frequently used to excess. Work, both productive and unproductive, is carried on with little regard to the limits of her strength or the necessity for rest. The

excretory functions are, as far as possible, forgotten, and constipation becomes habitual.

Such disregard of the recognized laws of health, persisted in for forty years, predisposes to the occurrence of serious disorders. It is at the menopause that many women begin to pay the penalty for their long-continued negligence.

Furthermore, the period of life between the fortieth and fiftieth years is likely to be especially trying to the emotional faculties. The loss of aged parents, of brothers or sisters in the prime of life, of children just arriving at maturity, or of trusted and life-long friends—one or more of these bereavements is likely to befall one at this time. Frequently a succession of these sad events produces an almost overwhelming depression of spirits. Besides these great and more obvious trials, the ordinary cares, troubles, and worries of life weigh one down at this age with more than ordinary irresistibility, because then one begins to feel that the years of greatest activity and vigor have passed, that old age is approaching, and that if the expectations of youth have not already been in some measure fulfilled, they will not be likely to be realized in the future. These depressing events and conditions act as exciting causes of many disorders to which the woman has predisposed herself by years of careless living.

After she has been suffering for weeks, and perhaps for months or years, she is very likely to wander into a physician's office and tell him that she has malaria. There are, it is humiliating to confess, a good many doctors who will tell her gravely: "Yes; you have malaria. You must take plenty of quinine."

If you inquire carefully in regard to the clinical history of one of these patients, you will find that she suffers from more or less of the following symptoms: Indisposition for exertion, inability to work, forgetfulness, headache, dizziness, insomnia, flushes of heat followed by chilly sensations, sweating, palpitation, flatulence, abdominal distention, and constipation. On making further examination you will probably find that her heart and lungs show no evidence of any organic lesion, and that her flesh is flabby, her pulse soft, her tongue coated, and the conjunctivæ are pale. She may have considerable intercostal neuralgia and frequent backaches, and tender spots may be detected in her head, back, and chest. She also sometimes complains of swelling of the face, hands, and feet, which, however, is often not a real œdema.

A study of the clinical history of these cases, and a consideration of the inconstant and changeable character of the symptoms, is sufficient to convince one that they are not of organic origin; that they are not associated with any distinct pathological change in the nervous system, but that, on the other hand, they may occur in connection with a variety of different conditions.

In some cases a disordered digestion is the most important factor in the causation and perpetuation of these very distressing symptoms. The chief disturbance may be in the stomach. Then eructations of gas and flatulent distention of the stomach are frequently the most annoying and most important symptoms. Or, on the other hand, the intestines and the associated glands may be chiefly at fault, and the most marked symptoms obstinate constipation and flatulent distention of the abdomen. Not infrequently these two conditions are found coexisting in the same case. They may then give rise to, or be associated with, a number of other symptoms, the most common of which are headache, dizziness, palpitation, and dyspnoea.

In some cases anæmia is an important element. This may be associated with disturbances of digestion, either as cause or effect. If both exist each may intensify and aggravate the other. If anæmia is present the patient usually complains of headache, dizziness, and dyspnoea.

In other cases insomnia is a prominent feature. This also may be a result of pre-existing derangements of function of various organs, and in turn, when present, may aggravate other disorders.

Finally, in many cases there is a distinct and well-marked element of nervous exhaustion. This is frequently the starting-point of other disorders, and when they are fairly established is intensified by them.

In making the diagnosis of this condition one should be very careful to exclude the possibility of the existence of any organic disease. In many cases organic diseases are accompanied by symptoms which resemble those which have been described as of frequent occurrence in connection with those functional disorders of the nervous system which are the subject of this paper.

Careful exploration must be made of the chest—of the lungs, but more particularly of the heart, to which many patients think that their troubles are referable—in order to detect the possible presence of commencing or latent organic disease. Careful analysis of the urine should be made occasionally, in order that no organic change in the kidneys may escape notice. The temperature should be taken now and then, especially if the action of the heart is at all accelerated, so that no febrile disturbance may be overlooked. Naturally inquiry should be made as to the manner in which each organ of the body is performing its function, and any deviation from the normal must be carefully noted and duly considered in deciding upon a plan of treatment.

The prognosis of these disorders is rather uncertain on account of the variety of circumstances which influence their progress. Many patients are exceedingly dilatory in seeking medical advice for these troubles. Many are very negligent about following up the treatment which is prescribed, and some fail to receive proper treatment because their

physicians make an erroneous diagnosis, or do not understand what therapeutic measures are adapted to the case.

The natural tendency of these disorders is to persist for months and years. They do not, however, have any inherent tendency to terminate in death. With proper treatment their severity may be mitigated and their duration very much abbreviated. If the patient seeks advice early, is judiciously managed, and follows up the treatment conscientiously and persistently, the prognosis is good. Care must be exercised to remove, as far as possible, the conditions which permitted the development of the symptoms in the first place, lest they return again after treatment has been discontinued.

In the management of these cases it is necessary to combine very careful hygienic regimen with appropriate medicinal treatment. Worry and care must be avoided as far as possible. Regular and prolonged rest must be secured. A moderate amount of mental occupation during waking hours is useful. Abundance of fresh air and moderate exercise are essential. Food which can be easily digested, and which has been properly prepared, must be taken regularly and in sufficient quantity. It must be eaten slowly and chewed thoroughly, and time must be allowed for the process of digestion to become fairly established before the resumption of mental or physical exertion. Tea and coffee must be entirely abandoned, and abundance of milk and water must be taken. Bathing and rubbing influence very favorably the circulation and the processes of nutrition. The body must be properly protected, so as to maintain an equable degree of warmth throughout, care being taken to avoid the extremes of an excess or a deficiency of clothing.

If the functions of any organ are not properly performed, the treatment must be so directed as to restore and maintain the normal action.

The digestive organs are perhaps more frequently deranged than any others, and require most careful attention to secure a proper performance of their functions. Constipation, flatulence, and anorexia are the most common and the most important indications for treatment. If constipation exists alone, a pill of aloes and myrrh taken at night, and followed, if necessary, by another in the morning, will generally produce a pleasant effect. Another excellent pill under these circumstances is one containing one-fifth grain of aloin and one-sixtieth grain of sulphate of strychnine. Two or three of these may be taken at different times through the day, if one at night is not sufficient. The object to be aimed at is to secure one easy movement of the bowels each day, unaccompanied by nausea or griping, by means of small doses, repeated if necessary, of some not very irritating laxative.

If anorexia, constipation, and flatulence are all present, a bitter mixture will generally prove useful—a combination of *nux vomica*, *cascara*

sagrada, cardamom and gentian, with aromatics, is exceedingly valuable under these circumstances.

If anæmia is well marked, iron and arsenic are very useful. If there is no, or only slight, disturbance of the digestion, pills containing sulphate of iron with carbonate of potash, known as Blaud's pills, with the addition of arsenous acid, produce excellent results.

If constipation accompanies anæmia, a pill or capsule containing arsenous acid, aloes, nux vomica, and reduced iron may be advantageously prescribed.

If neuralgia is a prominent symptom, five-drop doses of fluid extract of gelsemium will give relief in many cases. In connection with gelsemium, or in place of it, benefit will often be obtained from the use of sulphate of quinine with extract of hyoseyamus.

If the nervous symptoms are not accompanied by derangement of the functions of other organs, or if they persist after proper attention has been paid to the regulation of these disorders, it is necessary to prescribe remedies which act more directly upon the nervous system. The most useful drugs of this class are bromide of sodium, phosphorus and its compounds, nux vomica, and arsenic.

The use of arsenic has been already mentioned in connection with the management of cases in which anæmia is an important factor. In the treatment of certain forms of anæmia it is of great value. But besides increasing the production of red blood-cells, it unquestionably possesses the power, also, of promoting the nutrition and vigor of the nervous system. In combination with iron and nux vomica it is exceedingly useful.

The utility of phosphorus as a nerve tonic has long been recognized. A combination in pill form of one one-hundredth grain of phosphorus with one-quarter grain of extract of nux vomica has been used extensively and with excellent effect. One great drawback to its use is the difficulty of securing pills which have been properly made and in which the original characteristics of the drugs have been retained.

Phosphide of zinc is frequently substituted for phosphorus. One-tenth grain of this compound with one-fourth grain of extract of nux vomica will often prove of benefit.

The compound syrup of the hypophosphites is another preparation which is very popular with the profession, and which has positive value as a nerve tonic.

As a palliative agent, to produce sleep, to equalize the circulation, and to relieve the condition of nervous irritability commonly called nervousness, no drug is more useful than bromide of sodium. This salt is preferable to the other bromides because it is less unpleasant to take, and is less irritating to the stomach, while at the same time it is not inferior in therapeutic value. In prescribing this very valuable drug, one should never forget that it does not increase the strength or nutrition of the

nervous system. It should not, therefore, be relied upon for continuous prolonged administration to the exclusion of other remedies. On the contrary, its use should be supplemented by the administration of general tonics and of special nerve tonics. Iron and arsenic are especially well adapted for this purpose.

In conclusion the following propositions are presented:

1. At the time of life when the menopause occurs the various organs of a woman's body are likely to be in a state of depression as regards either their nutrition or functional activity, so that the normal equilibrium of healthy action may be easily disturbed, and abnormal action, the manifestation of disordered function, may be inaugurated and perpetuated.

2. The cessation of menstruation is an event of great physiological importance, and is perfectly competent to produce grave disturbances of the nervous system, if any predisposition to them already exists.

3. The more common disorders of the nervous system occurring under these circumstances are functional in character, and are associated with disturbances of functions of other organs, and especially of the digestive, circulatory, and hæmatopoietic systems.

4. In their treatment, attention should first be paid to improving the general nutrition of all the tissues of the body, and restoring each organ to its normal activity.

5. If, after all the other organs have resumed the proper performance of their functions, symptoms referable to a disordered condition of the nervous system still persist, recourse must be had to remedies which act directly upon the nervous system, either by improving its nutrition or by modifying and regulating its action.

THE FULL CORRECTION OF MYOPIA.¹

BY EDWARD JACKSON, M.D.,

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STATISTICAL studies of ametropia, the natural history of eye-strain and the behavior of emmetropic and ametropic eyes under the requirements of our present social organization, all support the idea that the emmetropic eye is the ideal eye; that emmetropia is the standard toward which the evolution of the eye has proceeded. The mass of eyes present low hyperopia; that is, they approximate the emmetropic standard from

¹ Read before the American Ophthalmological Society.

the side of hyperopia—the safe side—and they approach it with remarkable nearness and accuracy. The ametropic eye is at a disadvantage. It has to sustain itself and do its work under conditions to which the delicate balances of its actions and nutrition have not been adjusted by the process of evolution, and that under such conditions those balances are destroyed and disease results is not to be wondered at. Further, all statistics of the refraction of the eye in childhood or in races living under primitive conditions, as well as the known requirements of human life up to the late generations of civilized man, indicate that of all forms of ametropia the one to which the conditions of nutrition are least likely to be adapted is myopia.

This proposition is supported by all clinical observation. The myopic eye almost invariably presents the evidence of such destruction of the balance of the nutritive processes as constitutes organic disease of its nutritive coat, the choroid. Of the intimate connection of myopia and choroidal disease there is no question, and without asserting that the myopia is always cause and the choroidal lesions effect, it must be admitted that to a considerable extent and in all the more advanced cases such a relation does exist.

In view of these facts, it would seem rational that when an eye is found working under the disadvantages of myopia it should at once be placed under the same favorable conditions as the emmetropic eye—that its myopia should be fully corrected and the correcting lens constantly worn, except at such time and to such extent as the emmetropic eye would require the aid of convex lenses for presbyopia. This is, I believe, the proper attitude to take toward myopia. Such a line of treatment should be followed except where it is clearly and definitely contra-indicated in one of the ways to be referred to hereafter.

It is, however, certain that on the part of a considerable number of ophthalmologists there is a disposition to avoid the giving of a full correction for myopia, or a timidity about it that keeps them from giving such lenses for constant use, or induces the advice to use the glasses as little as possible. This timidity is abundantly evidenced in ophthalmic literature and in the practice of colleagues, and was formerly largely shared by myself. It is to aid in showing that such timidity is mistaken and harmful that I bring forward a portion of my clinical experience in this matter.

The following are notes of all the cases in private practice remaining under my observation for three years or upward after they commenced the constant wearing of the concave lenses, fully correcting their myopia or myopic astigmatism. The letters M. and F. indicate male and female. The age given is that at which the wearing of the full correction was commenced; and the occupations are those followed since putting on the glasses:

CASE I.—F., aged thirty-one years, a school-teacher, was ordered:

Right.—1.50 cyl. axis 180° . $V. = 4/4$.

Left.—0.75 cyl. axis 180° . $V. = 4/4$.

After wearing these for three years constantly, the refraction and acuteness of vision remained unchanged.

CASE II.—M., aged twenty four years, a bank clerk, was ordered:

Right.—1.75 sph. \odot — 0.37 cyl. axis 45° . $V. = 4/3$.

Left.—0.75 sph. \odot — 0.62 cyl. axis 30° . $V. = 4/3$ partly.

After three years, refraction and visual acuteness unchanged.

CASE III.—F., aged twenty-three years, doing housework, with reading and sewing, ordered:

Right.—5.50 sph. \odot — 1. cyl. axis 90° . $V. = 4/8$.

Left.—5.50 sph. \odot — 0.75 cyl. axis 135° . $V. = 4/8$.

After three years, refraction and visual acuteness unchanged.

CASE IV.—F., aged fifty-two years, librarian, was ordered:

Right.—15. D. sph. $V. = 4/6$.

Left.—14. D. sph. $V. = 4/9$.

Accommodation being entirely gone, she was ordered for near work: Right, 11. D., and left, 10. D. Previously she had worn 8. D. lenses for constant use, with a pair of 5. D. lenses in extra fronts which she occasionally added for clearer distant vision. After three years, refraction and visual acuteness remain unchanged, and the glasses have been in every way satisfactory.

CASE V.—F., aged forty-five years, housekeeping and reading, was ordered for constant use:

Right.—8. sph. \odot — 5. cyl. axis 25° . $V. = 4/8$ mostly.

Left.—8. sph. \odot — 11. D. cyl. axis 5° .

This was the full correction for the right eye, but the left eye required an additional 8. D. spherical, which gave vision $= 4/12$ mostly. She could not use the two eyes together satisfactorily, so the above was given, allowing her to use the right for distant, and the left for near, vision. After three years, refraction and visual acuteness remain unchanged.

CASE VI.—M., aged thirty-six years, clerk, was ordered:

Right.—2.25 sph. \odot — 1.25 cyl. axis 105° . $V. = 4/4$.

Left.—2.25 sph. \odot — 1.25 cyl. axis 65° . $V. = 4/4$.

Three years' constant use of the glasses with hard eye-work leaves the eyes healthy, with refraction and visual acuteness unchanged.

CASE VII.—M., aged twenty-four years, architect, was ordered for constant use:

Right.—0.25 sph. \odot — 0.50 cyl. axis 115° . $V. = 4/4$.

Left.—0.25 sph. \odot — 0.25 cyl. axis 20° . $V. = 4/4$.

After three years the refraction and vision remain unchanged.

CASE VIII.—F., aged sixteen years, in school, was ordered:

Right.—0.50 cyl. axis 180° . $V. = 4/4$.

Left.—0.50 cyl. axis 180° . $V. = 4/4$.

Three and one-half years later the refractive condition and vision were as follows:

Right.—0.25 sph. \odot — 1.25 cyl. axis 180° . $V. = 4/4$.

Left.—0.50 sph. \odot — 0.75 cyl. axis 180° . $V. = 4/4$.

CASE IX.—F., aged fifty-six years, a teacher of Latin, in poor general health, was ordered:

Right.—5. sph. $V. = 5/9$.

Left.—6.50 sph. $V. = 5/9$.

These were used for distant vision, while for near work concave lenses three dioptries weaker were given. After four years, visual acuteness and refraction unchanged.

CASE X.—F., aged thirty-four years, housekeeping, was given for constant use:

Right.—0.75 sph. \bigcirc — 3. cyl. axis 180° . $V. = 4/8$.

Left.—0.75 sph. $V. = 4/4$.

Four years later her correcting lenses and vision were as follows:

Right.—0.75 sph. \bigcirc — 3.25 cyl. axis 170° . $V. = 4/5$.

Left.—0.50 sph. \bigcirc — 0.50 cyl. axis 60° . $V. = 4/4$.

The improvement of vision in the right eye being doubtless of the kind that frequently occurs from the wearing of the correction for high astigmatism.

CASE XI.—M., aged fifty-six years, an actor, was ordered for distant vision:

Right.—1.25 sph. \bigcirc — 1.50 cyl. axis 95° . $V. = 4/4$.

Left.—0.75 sph. \bigcirc — 1.50 cyl. axis 75° . $V. = 4/4$.

Reading glasses were given allowing 2.75 D. spherical for presbyopia. After four years he is still using the same lenses with comfort, with acuteness of vision unchanged.

CASE XII.—F., aged twenty-seven years, housekeeping, was ordered for constant use:

Right.—0.75 cyl. axis 170° . $V. = 4/3$.

Left.—1. cyl. axis 10° . $V. = 4/3$.

Four years later she was found to require the following:

Right.—0.75 sph. \bigcirc + 1.25 cyl. axis 82° . $V. = 4/3$.

Left.—1. sph. \bigcirc + 1.50 cyl. axis 90° . $V. = 4/3$.

The myopic meridian having remained unchanged, and the emmetropic meridian become notably hyperopic.

CASE XIII.—M., aged forty-eight years, editor, was given for distant vision:

Right.—3.50 sph. \bigcirc — 0.62 cyl. axis 95° . $V. = 4/3$.

Left.—3. sph. \bigcirc — 0.62 cyl. axis 70° . $V. = 4/3$.

For reading he was given glasses with three dioptries weaker sphericals, and after four and a half years requires the following correction.

Right.—3.50 sph. \bigcirc — 0.87 cyl. axis 100° . $V. = 4/3$.

Left.—3.25 sph. \bigcirc — 0.75 cyl. axis 75° . $V. = 4/3$.

Before coming under my care he had suffered from serious choroidal irritation, and his myopia had been to some extent progressive.

CASE XIV.—F., aged nineteen years, student and teacher; ordered for:

Right.—2.25 sph. \bigcirc — 0.50 cyl. axis 5° . $V. = 4/4$.

Left.—2.50 sph. \bigcirc — 0.25 cyl. axis 165° . $V. = 4/4$.

After five years she was found to require:

Right.—2.25 sph. \bigcirc — 0.75 cyl. axis 15° . $V. = 4/4$.

Left.—2.50 sph. \bigcirc — 0.62 cyl. axis 165° . $V. = 4/4$.

CASE XV.—F., aged twelve years, in school, was brought to me for eye-strain. Under full mydriasis she was found to be emmetropic, with vision $= 4/3$ partly in each eye. With other measures she was given convex sphericals of 1. D. combined with prism 1° base in for use in reading and studying, and was entirely relieved. Two and one-half

years later she returned, and was found to require the following correction, which was prescribed and worn constantly:

Right.—0.50 sph. \odot — 0.25 cyl. axis 110° .

Left.—0.25 sph.

These for a time also relieved her, but two years later she required:

Right.—1.75 sph. \odot — 0.62 cyl. axis 110° .

Left.—1. sph. \odot — 0.25 cyl. axis 60° .

Vision has remained the same, and since the last change of glasses four years have elapsed without material change of refraction.

CASE XVI.—M., aged sixteen years, student, ordered for constant use:

Right.—1.75 sph. \odot — 0.37 cyl. axis 80° . V. = $4/3$.

Left.—1.75 sph. V. = $4/3$.

This patient came with a very clear history of myopia recently progressive, and its course was immediately checked, although near work was continued as before. Two and one-half years later he was found to require:

Right.—2. sph. \odot — 0.37 cyl. axis 65° .

Left.—1.75 sph. \odot — 0.37 cyl. axis 80° .

Since then three years have elapsed without change of vision or refraction.

CASE XVII.—F., aged eleven years, at school, required and was ordered:

Right.—6. sph. \odot — 0.50 cyl. axis 90° . V. = $4/5$.

Left.—6. sph. V. = $4/5$.

These have been worn constantly for five years without change of visual acuteness or refraction.

CASE XVIII.—M., aged twenty-eight years, bookkeeper, was ordered:

Right.—1.25 sph. \odot — 0.50 cyl. axis 110° . V. = $4/3$ partly.

Left.—1.25 sph. \odot — 0.75 cyl. axis 10° . V. = $4/3$ partly.

For a little time he was given weaker sphericals, with the same cylindrical lenses for close work, but soon gave them up. After five years his refraction was:

Right.—1. sph. \odot — 0.37 cyl. axis 115° .

Left.—0.75 sph. \odot — 1.37 cyl. axis 5° .

Vision remained unchanged.

CASE XIX.—F., aged fourteen years, in school, and subsequently teaching, ordered:

Right.—2.75 sph. V. = $4/4$

Left.—1.50 \odot — 0.50 cyl. axis 35° . V. = $4/4$

This patient came with history of increasing near-sightedness, for which she had been using for about a year concave 1.5 D. sphericals for distant vision. The disks were obscured by pink striated swellings, the neighboring retina swollen and hyperæmic, the choroids "fleecy," and the best obtainable vision = $4/6$. After ten days' use of duboisine her vision had improved to that given above, the swelling and hyperæmia had subsided, and a narrow crescent of choroidal atrophy was visible at the temporal side of the disk. After this, with the constant use of the glasses, vision remained clear and satisfactory for several years. Then she noticed gradual failure of distant vision without other inconvenience, and at the end of six years was found to require:

Right.—4.50 sph.

Left.—3. sph. \odot — 0.37 cyl. axis 25° .

In two years that have elapsed since, there has been no change of refraction, and vision is as good as ever. During the whole period she has been engaged in work requiring exacting use of the eyes.

CASE XX.—M., aged forty-nine years, merchant, was given for distance:

Right.—0.50 sph. \odot — 3.25 cyl. axis 33° . V. = $4/4$ partly.

Left.—0.75 sph. \odot — 4.25 cyl. axis 160° . V. = $4/4$ partly.

And for near work 2. D. spherical was allowed for presbyopia. After six years his visual acuteness was unchanged, and he required the following correction:

Right.—3.50 cyl. axis 33° .

Left.—0.37 sph. \odot — 4.50 cyl. axis 163° .

CASE XXI.—F., aged thirty-four years, bookkeeper, came for acquired myopia and difficulty of seeing with the left eye of a week's standing. She had a small partial central scotoma due to acute choroiditis. The latter yielded promptly to treatment, and she was ordered:

Right.—1.25 sph. \odot — 0.50 cyl. axis 100° . V. = $4/4$.

Left.—1. sph. \odot — 0.25 cyl. axis 180° . V. = $4/4$.

She was also given glasses with weaker sphericals for near work, which were used considerably from time to time but ultimately discarded. At the end of seven years she requires:

Right.—1. sph. \odot — 0.87 cyl. axis 95° . V. = $4/3$ partly.

Left.—0.87 sph. V. = $4/3$ partly.

CASE XXII.—F., aged twenty-four years, art student, was ordered:

Right.—5. sph. \odot — 1.25 cyl. axis 35° . V. = $4/8$ partly.

Left.—3. sph. \odot — 1.25 cyl. axis 140° . V. = $4/4$.

She has worn these glasses constantly ever since; vision remains unchanged for distance. She states that "they meet every requirement," and that "the eyes never ache or give any trouble." But as they have not been recently tested it may be that in the seven years that have elapsed there may have been some change of the myopia.

CASE XXIII.—F., aged seventeen years, student, teacher, and journalist, was ordered:

Right.—3.75 sph. \odot — 0.50 cyl. axis 105° . V. = $4/5$.

Left.—4. sph. V. = $4/4$.

After four years it was found that she required:

Right.—3.50 sph. \odot — 0.75 cyl. axis 105° . V. = $4/3$ partly.

Left.—3.50 sph. \odot — 0.37 cyl. axis 150° . V. = $4/3$ partly.

These glasses have now been worn four years; vision is unchanged, the eyes quite comfortable, and the fundus normal.

CASE XXIV.—F., aged fourteen years, student and teacher, with a clear history of progressive myopia, was ordered:

Right.—5.75 sph. \odot — 1.50 cyl. axis 180° . V. = $4/6$ partly.

Left.—5.75 sph. V. = $4/6$.

After six years she returned with trouble with her eyes and the habit of looking obliquely through her glasses, and was found to require:

Right.—5.50 sph. \odot — 2.25 cyl. axis 180° . V. = $4/6$.

Left.—5.75 sph. \odot — 0.87 cyl. axis 175° . V. = $4/4$ partly.

These she has worn for two years without further change or trouble.

CASE XXV.—F., aged twenty-one years, housekeeping, a great reader, was ordered:

Right.—6. sph. V. = $4/6$.

Left.—6. sph. V. = $4/6$.

These were worn constantly for five years. Then a -0.50 cyl. axis 180° was added to the left eye, and she continued to use them without any change of acuteness of vision or trouble with the eyes until her death, four years later.

CASE XXVI.—F., aged thirty-two years, music-teacher, had irregular astigmatism and increasing myopia, for which she had worn 3. D. sphericals. She was given for constant use:

Right.— 3.75 sph. \odot — 1.75 cyl. axis 110° . V. = $4/9$.

Left.— 5.25 sph. \odot — $2.$ cyl. axis 70° . V. = $4/9$.

These have been worn for nine years without change of visual acuteness or trouble of any kind with the eyes.

CASE XXVII.—M., aged seventeen years, student and bookkeeper, came with a history of myopia increasing for two or three years. He was ordered:

Right.— 4.25 spherical. V. = $4/3$ partly.

Left.— 3.75 spherical. V. = $4/3$ partly.

Three years later his eyes were still comfortable and acuteness of vision unchanged. But about eighteen months after that he returned with symptoms of eye-strain and imperfect distant vision. He was now found to require, and was ordered:

Right.— 5.25 sph. \odot — 0.25 cyl. axis 30° . V. = $4/3$ mostly.

Left.— 4.25 sph. \odot — 0.50 cyl. axis 145° . V. = $4/3$ mostly.

Two years later, after a period of profound anæmia and disturbance of general health, he returned, and was given the following correction:

Right.— 5.50 sph. \odot — 0.75 cyl. axis 60° . V. = $4/3$ mostly.

Left.— $5.$ sph. \odot — 0.50 cyl. axis 120° . V. = $4/3$ mostly.

Since then two years have elapsed without further change of refraction or evidence of disturbance of ocular nutrition.

A review of the above shows that of 27 cases, 19 exhibited no change in the amount of myopia of over one-quarter dioptre during the period that they were under observation, varying from three to nine years; that in five cases—VIII., XV., XIX., XXIV., and XXVII.—there was some increase of myopia; and that in three cases—XII., XX., and XXIII.—the myopia diminished. It is, however, of equal importance to observe that in no case was there any diminution of visual acuteness, that all cases of increase of myopia were between the ages of twelve and twenty-five years, and that *in every case the full correction of the myopia checked, at least temporarily, the progress of disease in the eye*, and gave relief from the symptoms of eye-strain which in a large proportion of cases brought the patient to seek professional aid.

In Cases IV., V., IX., XI., XIII., and XX., the patient having passed the age of forty-five, allowance had to be made for presbyopia; but, except for near work, the full correction was worn constantly, without increase of myopia or other unpleasant effect in any case.

The cases above reported are all that I have treated by the constant use of the full correction that have remained under observation three years or upward. In addition, I have had a considerably larger number that were under observation for shorter periods, in none of whom have

I reason to think there has since been increase of myopia or other unfavorable symptoms, although it is not unlikely that cases of such change may have occurred. The cases that might be considered unfavorable—those in which there was subsequent return of asthenopia and increase of myopia—are all included in the above series. I can furnish an equal number of unfavorable cases from a much smaller series treated by partial corrections before becoming satisfied of the superiority of the plan of full correction.

If clinical experience makes such favorable report of the plan of full correction, and I believe that my experience in this regard will not be found exceptional, it will be of interest to inquire why it has been regarded with doubt, or the practice directly opposed by so large a number of writers and practitioners. Apparently this attitude is due to a fear that use of the accommodation is likely to cause increase of myopia. This fear is readily recognized in the teachings of many ophthalmologists, as in this statement which Landolt (*Refraction and Accommodation of the Eye*, English edition, p. 490) emphasizes by printing in small capitals: "A myope must be prohibited from wearing a concave glass for any distance at which he can see clearly without accommodation."

It is taught that use of the accommodation tends to increase the intra-ocular tension. In support of this, reference is sometimes made to certain experiments upon the lower animals. But of these experiments, it is only needful here to remark that their results have, on the whole, been utterly contradictory, and that the conditions of experiment are so different from those of physiological accommodation as to make even definite and confirmed results inapplicable to the question under consideration.

Next there is adduced the phenomenon to which attention was first called by Graefe, that if during the ophthalmoscopic examination the patient were induced to make a strong effort of accommodation there was a visible increase in the pulsation of the retinal veins. The observation as to the occurrence of this increased pulsation is easily verified, and the most probable explanation of it is that of increased intra-ocular tension. But the inference that this increase of tension is due to the use of the accommodation is incorrect. No such exertion of the accommodation as is required to cause the increased pulsation is possible without increased innervation of the lateral recti muscles, if not actual convergence of the visual axes. And in view of the compressing effect that contraction of the recti muscles necessarily has on the globe, it is entirely gratuitous to attribute any accompanying change of tension to exertion of the accommodation. Furthermore, the pulsation occurs under similar effort in eyes in which the accommodation is completely paralyzed by a mydriatic.

Again, it is frequently stated that the power of accommodation is essentially less in myopic than in hyperopic and emmetropic eyes, and this statement is commonly supported by reference to alleged differences in the ciliary muscle in myopic and hyperopic eyes, and a plausible explanation of why we ought to expect the accommodative power to be less in myopes. As a matter of careful observation, I do not find any general or essential deficiency in the accommodative power of myopic eyes. And where at the first trial some deficiency is found, it rapidly disappears with the constant use of the correcting lenses.

The best reason for fearing harm from accommodative effort in myopia is found in our acquaintance with its disastrous effects in other forms of ametropia. The retinal and choroidal changes of eye-strain are constantly before our eyes, and they are, without doubt, often associated with undue effort of accommodation. But it should be remembered that for the accommodation, as for every other function, there is a normal activity as well as an abnormal one, there is use as distinguished from abuse, and that the one is probably as important a factor in sustaining the ocular health as the other is in developing disease.

In this connection let me submit this thought: It is probable that there is some method of physiological compensation for increased functional activity within the eyeball by an increased flow of nutritive and excretory fluids. Now, from what we know of the relation of the ciliary body to the intra-ocular nutritive supply, and its relation to the paths of outflow, it is extremely probable that the act of accommodation does exert a decided influence upon the nutrition of the eye, and that the exertion of the accommodation in some such manner as it is exerted in emmetropic or slightly hyperopic eyes is an important factor in sustaining the intra ocular health. It is not unlikely that certain choroidal conditions, common to myopic eyes and those that are suffering from senile degeneration, are directly due to the absence of active accommodation.

Finally, those who do not practise the full correction of myopia feel confirmed in their position by the frequently injurious effects of partial corrections. They reason that if the wearing of a weak concave lens is disastrous, the wearing of a stronger one would be more disastrous. But in this they err, failing to appreciate that the wearing of a partial correction of myopia is necessarily more dangerous than the wearing of the full correction. The reason of this is that the myope with a partial correction, will, in the effort to see as well at a distance as possible, look obliquely through his glasses, and so get the effect of a tipped or obliquely placed lens. What this effect is has been well shown by Dr. G. Hay (*Transactions of the American Ophthalmological Society*, 1875, p. 319), by Dr. John Green (*ibid.* for 1890, p. 690), and by Pickering and Williams (*Proceedings of the Amer. Academy of Arts and Sciences*,

1874-75). In 1887 I called attention to the practical importance of this in a paper read before the Section on Ophthalmology of the American Medical Association (*Journal of the American Medical Association*, November 9, 1887), but it is still far from being so generally appreciated as its importance demands. This looking obliquely through his correcting lenses causes the myope to receive heterocentric or astigmatic pencils of rays, exposing him to all the dangers of uncorrected astigmatism, aggravated by the fact that with every movement of the head or eyes the amount of such astigmatic effect varies.

Of the conditions contra-indicating the constant use of the full correction for myopia, coexistent presbyopia has already been alluded to. Being universally recognized, no more need be said of it. But allied to it is the condition of a few younger patients doing large amounts of near work, who get along better, if myopes, with an under-correction, if hyperopes with an over-correction for near work, and who even though emmetropic are helped by convex glasses. Two of the patients in the above series were of this class, at least temporarily. Such cases may be suspected from their history, and certainly recognized by trial. But it must be emphasized that they are among myopes, as in other refractive conditions, quite rare.

A second contra-indication is such diminution of visual acuteness that perfect focussing of the rays falling on the retina is not appreciated. Here there remains no reason for giving the full correction, while to get the largest retinal image the weakest lens compatible with such vision as is attainable is indicated. Similar in effect is the condition reached by old myopes when, on account of long familiarity with them, they prefer the large, blurred images of uncorrected or partly corrected myopia, to the small, sharp image of full correction.

Another class of cases to which the full correction should not be given, the only class to which Landolt's dictum, above quoted, applies, is that in which binocular fusion has been partly or wholly given up in the interest of better monocular vision. If relative divergence is fully tolerated, the strain of convergence, which is one of the great indications for the use of the correcting lenses, no longer exists, but is liable to be excited consensually by efforts at accommodation. As this class includes many high myopes, its exception is an important one.

In this connection it should be mentioned that the inconvenience and even pain excited by the first attempts to wear strong correcting glasses are not a contra-indication to their continued use. These may be tempered to the impatience or skepticism of the patient by partial correction or interrupted use of the glasses; but they are of precisely the same significance as the cramp or soreness produced by any other unfamiliar exertion and co-ordination of muscular effort. They are always temporary, and usually trifling in comparison to the benefit soon realized from persisting in the effort.

THE CLINICAL HISTORY, NATURE, AND TREATMENT OF
"MILK-SICKNESS."BY J. HOWELL WAY, M.D.,
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INFLUENCED most probably by the scant and skeptical references to the disease contained in our text-books of medicine, I was at one time inclined to question whether or not there really existed such an affection as "milk-sickness." But residence for several years in a section where it has been known from the days of the earliest settlers, and where at the present time occasional cases, both in man and in the lower animals, are still met with, I have been made to realize from personal observation that there is a disease, distinct and separate from others, to which the term "milk-sickness" is perhaps as appropriately applicable as any other title (with our present knowledge of the subject) would be, especially since it does not, as do so many of our nosological terms, inculcate any false ideas relative to the etiology or pathology of the disorder named.

CLINICAL HISTORY.—The clinical history of milk-sickness will be considered in two parts—the first very briefly noting the symptoms and progress of the disease as it appears in the lower animals; the second treating more at length of the various manifestations of pathological action that mark the course of the disorder as met with in human beings.

The disease *in animals*, such as cattle, horses, sheep, or other of the domesticated animals, all of whom seem to be subject to the affection, has been termed "the slows" or "the trembles"; the latter term having, I believe, the sanction of greater general usage. This name, "the trembles," owes its origin to a peculiar and irregular twitching of the voluntary muscular system, resembling the freshly exposed muscles of a recently killed animal, and frequently compared to it, always exhibited by the various animals subject to the disease as soon as it has become well developed. And, though named from a symptom of the disorder only, it has at least the merit of not seeking to perpetuate some doubtful or perhaps fanciful notion as regards its pathology. Occurring in animals from which infection is most often conveyed to man—in cattle—the earlier indications or manifestations of "the trembles" are not specially significant. The individual members of the herd earliest affected are the unweaned calves, and their mothers the last; the former having two sources of possible infection, *i. e.*, the original source, whatever that may be, and the mother's milk also. The latter have, in common with the other members of the herd, the original source; but an additional safeguard, or safety-valve it might be termed, in the elimination of the *materies morbi* in the milk.

An animal infected with the poison of the disease becomes at first listless and indifferent, being more inclined to mope around with drooping head and listless eyes, and standing apart, alone, rather than associating with its fellows. At this time, as well as later on, it stoically refuses all food, but will frequently drink water with avidity. The hide looks rough and uneven. The skin is never preternaturally warm; if any variation from normal exists, it is usually colder. The bowels, as a rule, are obstinately constipated. If the affected animal be allowed to remain quiet in one place these symptoms may not be materially altered for two or three or even four or five days; but if the animal be forced to undergo exertion the characteristic "trembles" are speedily induced. The deleterious or even dangerous influence of forced exercise is not only shown at this stage of the disease, but even later on in its course, when violent exercise will speedily result in death. The promptness with which forced exertion brought out or developed the disease, when latent and giving no particular indications of its presence, is a fact long recognized in localities where the disease has been endemic, and one often taken advantage of by the stock-traders in pioneer days, when the disease was immeasurably more frequent than now, who, when negotiating for cattle, sheep, swine, or horses, would invariably include as a part of the bargain the privilege of driving the animals for a time, and then leaving out those showing evidence of the "trembles." With the onset of the trembling stage, in addition to the animal manifesting great thirst and the bowels continuing persistently constipated, there develop symptoms pointing to a profound degree of prostration and impairment of nervous power. The animal affected rapidly weakens, and generally lies down—in grave cases stretching itself at full length—and is now with the greatest difficulty induced to get up or to move about after rising. Should the animal now receive appropriate treatment—and in a few cases, though the latter are decidedly exceptional, without any treatment whatever—an improvement in the general condition takes place and recovery gradually ensues. In unmolested cases, and in a majority of all cases, the symptoms of profound prostration increase, and the animal lies at full length, with cool skin and colder extremities, all nasal secretion entirely suspended, eyes glossy and staring, with nictation slow and infrequent at first, and later entirely abolished; a severe blow or pricking or prodding the skin now fails to elicit any attention, and death gradually ensues.

In man the onset of milk-sickness is never sudden or violent. There are no severe afternoon headaches, no chilliness or rigors—in short, but few or none of the usual series of prodromata of severe or serious acute disease. The individual grows unaccountably weak on the slightest exertion, easily tires, is indisposed to exert himself even in the least degree, is apathetic and languid to an extent that no matter how energetic or

active he may naturally be, finds it impossible to arouse himself to his accustomed activity. Coincident with these changes in disposition, loss of appetite comes on, attended most usually from the very start with a marked repugnance to food and decided nausea. The tongue at this time is moist and covered with a soft white fur. In some cases where the patient remains quietly within doors, refraining from physical exertion, there is little or no further development of the disease for three or four, or sometimes even five or six days, but usually a much shorter space of time elapses before more pronounced symptoms are exhibited. There may be some degree of cephalalgia present now—generally there is not; the patient usually, in answer to this question, stating that his head feels quite comfortable. There is in most cases now a marked degree of thirst present, and water is drunk freely, but generally vomited immediately. The tongue is large, heavy, and flabby, being thickly coated with a dirty white fur, and the breath assumes a peculiarly offensive odor which, in many cases, it is claimed, has led to the detection of the disease before any trembling set in. This peculiarity in the odor of the expurged air—a sweetish foulness compared to the breath of an unweaned calf—is not easily described, but once observed it will be readily noted if present in subsequent cases of the disease. So much consideration is given to this peculiarity of the breath that many laymen and numerous physicians who have seen much of the disease confidently claim that even blindfolded or in the dark they could readily detect the disease. While not entirely prepared to vouch fully for the scientific accuracy or correctness of this claim, I must state that in the few cases of the disease it has been my pleasure to see there was a special odor about the expirations which I have not observed in any other disease, and which persisted during the course of the disease until convalescence had been established, being quite as marked after the tongue and mouth had been thoroughly scrubbed with antiseptic washes as before. The nausea is increased, and is usually extremely persistent, constituting, from the patient's standpoint, perhaps the most disagreeable feature of the disease. Vomiting occurs frequently, and is attended with very little immediate relief. The fluid expelled from the stomach most frequently has a slightly bluish color, and is not, as a rule, very abundant in quantity, many of the efforts at emesis being unattended with the ejection of any fluid whatever. Contrary to expectation, it is true that even where there is much retching there is rarely developed any tenderness in the epigastrium. Late in the course of fatal cases the vomiting ceases from sheer exhaustion, the nausea, loathing of food, and desire to vomit still continuing, and the futile effort made producing a peculiar sound heard now and then during expiration. Hiccough is frequently a source of much annoyance, especially in the latter stages of the disease. The abdomen is flat, apparently empty, and its walls flaccid. There seems to be a complete

suspension of all peristaltic activity, the bowels being obstinately constipated, though in exceptional cases it is claimed that diarrhœa may be present instead. The respirations are shallow, and at times in the course of the disease, increased slightly; the inspiratory effort is short and the expiration made with apparently some degree of effort, and prolonged, ending much of the time in severe cases in a low half-suppressed moan. The frequency of the cardiac action is not increased, as a rule; in the earlier and middle period of the disease it may be at times slowed, but in the profound prostration that ensues prior to death it is increased. its action is labored, and the larger arteries seem to be unusually well filled.

Marked abdominal aortic pulsation is present which through the flaccid and relaxed abdominal parietes is easily observed, being sometimes sufficiently strong to be noted with the eye by its elevating, with each pulsation of the heart, the patient's covering, and constitutes one of the characteristic symptoms of the disease. The radial pulse, while not increased in frequency, is always weak and compressible, in striking contrast to the marked fulness of the larger central arterial trunks. The urinary excretion is generally lessened until sometimes not more than six to eight ounces are excreted in the twenty-four hours; coincidently with the decline in quantity traces of albumin may be found. The skin is cool, dry, and feels harsh; no visible perspiration is present. The nose and extremities communicate a sensation of coldness when touched.

The temperature is never elevated; usually it is subnormal, ranging during the course of the disease, from 97° to 98° F. At times it may be even lower than 97° F., and a return to normal or, as not infrequently happens, a slight elevation of one or two degrees above normal occurs coincident with improvement in cases that recover. The low temperature range is in striking contrast to the feelings of the patient, who will complain of being very hot and desire to be fanned much of the time. Next to the nausea and gastric distress, this subjective sensation of heat is the source of greatest discomfort to the patient.

Generally speaking, the listless indifference shown by the lower animals during the course of the disease is also seen in man; calls for water and little covering, or frequently none at all, will often be the only desires expressed by a patient; his surroundings, friends, relatives, or the future concern him not. In very grave or fatal cases the patient sinks into a condition of semi-coma or coma. The respirations grow less frequent, and sighing and more shallow; the pulse quicker and feebler, the listless, wan look increases, winking is very slow and at infrequent intervals, the conjunctivæ becoming dry and the corneæ glassy. The patient may lie in this condition, apparently halting between life and death, for hours or even a whole day, and recovery, at times, take place, but usually the respirations grow shallower, the heart weaker, the coma

increases, and, quietly and without any struggle or semblance of pain, death ensues. Delirium is very rarely present in either fatal or non-fatal cases. The different stages of the disease insensibly glide into each other, and if there be such a thing as a well-defined crisis in milk-sickness it must be in very rare instances.

MORBID ANATOMY.—My observations on this line have been limited entirely to a few cases in the lower animals where a fatal result ensued. In each of these cases there were *macroscopically* visible evidences of internal congestions of variable extent, more especially of the abdominal viscera. In one instance (an unweaned calf, six weeks old, found dead, supposed to be from "trembles") there was intense congestion of the cerebral meninges and some effusion; the abdominal organs being very moderately congested. Lack of time and imperfect technique rendered the microscopic examinations made of tissue and secretion unsatisfactory to myself, and of no value to the profession.

ETIOLOGY AND PATHOLOGY.—There are perhaps very few affections that human beings are liable to, and do suffer from, about the nature of which there have been more conflicting theories suggested than about milk-sickness. And yet, in reference to it, there is perhaps a better excuse to be offered for the general ignorance of the profession than can be set forth as an apology for our ignorance concerning almost any other disease. The vast majority of all the cases of milk-sickness that have been observed by medical men were seen by our *confrères*, the pioneer doctors—a class of worthy gentlemen more wedded to deeds than words—men who, nobly as they bore the burdens of their day, were as a rule unfitted by training for the elucidation of the more intricate problems of pathology; hard-worked, and not possessing the leisure even when they had the requisite knowledge and inclination essential to conducting such an investigation—men who read little and wrote still less. And, as the irony of fate will have it, now that these sections of country are inhabited by medical gentlemen who would gladly, in the interest of science, strive to clear up the mystery enshrouding the disease, it has entirely disappeared, or only an occasional case is seen.

In striving to acquire some idea as to the etiological nature of milk-sickness, it is well to first note some important peculiarities as regards the action of the poisonous principle giving rise to the disease; for, while not knowing to a certainty the *exact* nature of the *materies morbi*, we are in possession of quite a number of interesting facts relative to its mode of action and the circumstances under which the infection of animals takes place. The morbid material is unquestionably specific in its nature, producing milk-sickness and no other disease; and it may be with equal truth asserted that milk-sickness never originates or develops without this specific poison being present. The disease never develops in old or thickly settled communities where the land has been denuded

of its primitive growth or cultivated for a short time. Of course, it is possible that persons living in such places might contract the disease from the use of the flesh products of animals brought from infected regions. The possibility of the occurrence of the affection in this way would suggest the advisability of physicians in cities remote from the haunts of the disease being familiar with its symptoms and course, for at the present time, when railways are branching out into all of the hitherto out-of-the-way places, possibly travellers might become infected and the disease develop far from the source whence the infection came. Again, another possible danger lies in animal flesh, and especially in dairy products shipped, from places where the disease exists in cattle, to distant markets.

The mere removal of the timber and shrubs from a piece of land and the letting in of the sunlight to contact with the soil in places where animals have been known to contract the disease, as repeated observations in this and other localities have shown, will in a short time effectually and permanently remove all possibility of their contracting the disease in that place again. Animals allowed to roam at will and graze over a piece of wooded land known to have been a source of infection to cattle at various times in the past, will not contract the "trembles" if driven in in the afternoon and not allowed to remain on the infected ground over night or while it is wet with dew. These facts, as well as numerous others which I have herein laid down with what may seem an appearance of dogmatism, have been largely matters of personal observation to me during seven years' residence in this county, which is quite a large one, containing an area of more than seven hundred square miles, more than six hundred of this being yet in primitive forest. It has a hardy, vigorous population of thirteen thousand. It is mountainous. It has a thin but very productive surface soil of a few inches in depth, resting on a deep layer of stiff red clay subsoil. Its altitude ranges from 2400 feet in the lowest valleys to quite 6000 at the tops of the highest mountain peaks. In this county there are at least nine or ten "coves," or small wooded valleys, yet in primitive forest, known to be infected places. These places, some of them definitely located by the accumulated experience of at least three preceding generations of people as containing perhaps only a few acres, or in some instances less, are usually kept carefully fenced in, and cattle, horses, sheep, etc., are prevented from feeding on them; or if allowed to range in woods where an infected region is known to exist, they are carefully looked after and driven in early and not allowed to graze again until the dew has well dried. In this way prophylaxis is usually successful, and the opportunities for the study of the disorder, either in man or in the lower animals, are of not very frequent occurrence. But occasionally cattle or other animals stray off, lying in the woods over night, and contract the disease, or, as I have

known to happen, some newcomer, skeptical of the stories about "the milk-sick," told and retold him by the natives (who never seem to tire of discussing the disorder, and who almost seem to feel a special proprietorship in it, as they have been told "the books say little or nothing about it"), grazes his cattle "where he pleases;" and cases of trembles in the stock, or if milch cows be in the herd, in persons who use the milk or butter, are shortly afterward seen.

The type of soil does not seem to have any special influence as determining whether or not a given piece of ground contains the poison of the disease or not. In like manner, identity of flora seems to exert no influence; for instance, it has been observed here that cattle of the same herd grazing in one field or in one pasture will not have the disease, while their fellows in another pasture, seemingly identical in soil and flora, will develop cases of "trembles." The disease occurs, as a rule, in the late summer or early autumn months. Cases have been noted, however, as occurring in the winter months in both cattle and human beings, and were attributed to the cattle being fed on imperfectly cured grass cut from wet, shady, and swampy ground, where the disease had been suspected to exist. The disease is most likely to occur in autumn, after a warm summer in which there has been a light rainfall. In seasons when the rainfall has been heavy it may even fail to develop at all, and is certainly, if active, less so than during or after a dry season.

Among the older theories entertained by those familiar with the disease was the ingestion of some unknown mineral poison, which, having an affinity for moisture emanated from the soil with the dew and adhering to the vegetation, was devoured by animals while grazing. Again, it was assumed to be due to a mineral substance emanating from the soil and, assuming a volatile form, was inhaled by animals. Still others held to the idea that it was some toxic plant ingested by animals grazing in certain places, the active principle being in part eliminated through the milk and also penetrating and rendering poisonous the animal's flesh. Marsh miasm and a polluted water supply have also been urged as being probable causes of milk-sickness. Most recently bacteria have been suggested as the exciting factors, and here, I believe, we are in a fair way to arrive at a correct knowledge of the true nature of the disease. The clinical history of the cases I have seen decidedly negative the idea of either mineral or vegetable poisoning, so also do well-known facts connected with the development of the disease. The marsh-miasmatists were very near the truth, if their theory had only been developed more fully. With the adoption of the theory of a bacterial origin for milk-sickness, we have a theory that is in all respects tenable, fully consistent with the known facts relative to the disease, as well as one that I believe susceptible of demonstration. If we regard the miasmatic or germ theory as proven for malarial fever, then we can most

readily adopt it as most rational of all theories for explaining the phenomena of milk-sickness, for in no other disease is there so complete a parallelism of facts corresponding to malarial disease as is found in the development and course of milk-sickness. Let us note some of these complementary characteristics, and see if they are not sufficiently convincing to warrant the belief that milk-sickness in man and the "trembles" in animals, while not malarial disease as we understand that term, is without doubt an analogous affection and one possessing an analogous etiology.

The normal habitat of malarial poison seems to be new, undeveloped, marshy, undrained lands. Remove these conditions, and the disease, if existing at all, is in a greatly modified form. Milk-sickness has invariably been associated in its causation with primitive conditions of soil and vegetation, and as invariably has disappeared on the development of the land. Malarial diseases have no definite or fixed duration, and are not communicable from the sick to the healthy. Milk-sickness, in like manner, has no positive duration or regular course, and cannot possibly be communicated to others like most specific fevers. Both are essentially irregular in type and characterized by variations in their clinical histories. An attack of malarial fever is said to render the individual more liable to another, and impresses upon the system a *tendency* to the disease, which is liable to show itself from time to time. So it is with milk-sickness, the recurrent tendency being marked, and in many of the cases for months afterward there is a disposition to an outcropping of some of the symptoms of the former trouble. Both leave this peculiar impress upon the system. Unarrested by treatment the course and duration of malarial fevers may be protracted and uncertain. So with milk-sickness, its course is very materially modified by the treatment. The cinchona preparations seem to exert a special and peculiar influence upon the course and the duration of malarial disease. In like manner it has been, wherever the disease has been known, a matter of universal observation as regards the peculiar and specific action of alcohol upon the course of milk-sickness. It is evident that the poison of milk-sickness, both in its history and its effects on the animal economy, bears a closer analogy to the poison of malarial fevers than to any other known morbid agency. The toxic principles originating the two diseases are, without doubt, two different organisms, but the striking analogies in their natural history are sufficiently close to warrant us in regarding them as generically allied, though specifically distinct.

As to the precise nature of the bacteria giving rise to "trembles," or milk-sickness, the investigations of Dr. J. Gardner, of Indiana (*Reports of the Bureau of Animal Industry*) on the blood of a heifer dying of "trembles," while not conclusive, are at least suggestive. Thus, in the

microscopic field "were countless multitudes of actively moving bacteria that bore in size and behavior a striking resemblance to that form of bacteria known to naturalists as *B. subtilissima*. They seemed to cling to the blood-disks, to be between them, and some few within them. . . . Some dogs ate of the flesh of the dead heifer; they, too, were attacked with 'trembles,' their blood showing the same form of bacteria." It has been a matter of some regret to me that I have not been able to substantiate the above in its entirety. However, my belief in the bacterial origin of the disease has in no wise been shaken, and it is my hope if any cases of the affection occur in this section this season, that with more perfect arrangements for conducting a thorough microscopic investigation I shall be able to add additional demonstration to the bacterial theory, which alone offers us a satisfactory solution of the much-discussed etiological question.

DIAGNOSIS.—Locally here in the rural communities of western North Carolina, where occasional cases of milk-sickness are seen, it is most likely to be mistaken for cases of "mountain fever," "continued fever," or typhoid fever, as the greatly modified types of enteric fever met with here are variously termed. Gastro-enteritis and possibly some types of malarial fever (the latter, however, never being seen here as an indigenous disorder) notably pernicious malarial fever, might be mistaken for milk-sickness, and *vice versa*. From these maladies, however, the subnormal temperature, the flattened abdomen, with its lack of tenderness, the strongly-marked abdominal aortic pulsation, the peculiar odor of the expirations, even in the absence of cases of "trembles," in animals, ought to suffice to establish the diagnosis. In the sections here, where cases of milk-sickness do occur, it is very frequently suspected where it is not found to exist. The peculiar inhibition of the heat-production centres, manifesting itself clinically in a subnormal range of temperature, has impressed itself upon me as being a very important diagnostic point, and one but little, if at all, noted in the accounts of the disease which occasionally appeared in the provincial journals in the earlier half of this century. While, of course, this subnormal temperature is at times seen in cases of enteric fever, it is here the rare exception, while in "milk-sickness" it is the rule to which the exceptions are very rare.

PROGNOSIS AND TREATMENT.—Of all diseases the continuance of which seemingly tends intrinsically to a fatal termination in perhaps the majority of untreated cases, I know of none which in the main responds more readily to proper treatment, or in which the benefits of treatment skilfully applied, are more quickly apparent and more enduring in results than milk-sickness. Without needlessly occupying space in a recital of the various methods of the past, the treatment successfully pursued by myself and colleagues, who have nearly each season one or more cases

to treat, will be briefly set forth. There seems to exist in every case two important indications: to establish and promote secretion (elimination?), to strengthen and maintain the vital powers. Empirically, many old laymen now dead, or past their "threescore and ten," have in this mountain country, hemmed in and cut off from the balance of the world until recently (when railways were first built), where doctors were few and hard to get, learned to diagnose and to treat most cases of milk-sickness with an acumen which it pleases me to have this opportunity of recording, and of congratulating them upon. I have more than once "sat at the feet" of these Gamaliels, wise and sagacious though often unlettered as they were, and heard the recital of their experiences with the disease—experiences now forever ended, the disease being in most sections extinct, whilst in places where it is occasionally seen the Medical Practice Act and the plentifulness of doctors cause the latter to be sought. The treatment I first learned from these old men, and which I have found so very efficient in the cases it has been my fortune to meet with that I have seen no reason for substituting another, is to establish secretion by the free exhibition of mercurials, to be subsequently maintained with full doses of sulphate of magnesia, or preferably castor oil, and plenty of good whiskey or brandy—the latter, generally speaking, and more especially in severe cases, being preferable. With some minor variations in individual cases, the above treatment, simple and with a strong flavor of old-fashionedness about it, will fully meet the apparent necessities of cases of "milk-sickness" during the height of the disease. Later, during convalescence, tonics such as quinine, nux vomica, mineral acids, the hypophosphites, will prove of great value in restoring to healthy action the gastro-intestinal tract, which in many cases will demand more or less attention.

HÆMOLYMPH GLANDS.

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IN the *Quarterly Journal of Microscopical Science*, 1883, N. S., vol. xxiv., will be found a paper of mine on some structures lying between the renal artery and vein in the human subject. These small bodies consisted of minute ganglia, lymphatic glands, a small body having the structure of the supra-renal capsule, and some glandular bodies which somewhat resembled compound lymphatic glands, with

this difference, that instead of lymph circulating through them, there was a current of blood passing into what would be the lymph sinuses in a lymphatic gland, from vessels lying in the fibrous trabeculæ. I found these structures in three consecutive cases, and concluded that they were permanent. Other work intervened, and I did not at that time examine any more cases for these interesting structures.

In the *Lancet*, November 29, 1890, there appeared a paper by W. F. Robinson, a student of Edinburgh University, working under the direction of Dr. Russell, entitled "Prevertebral HæmolympH Glands," giving a description of these glands in the sheep and bullock as well as in man, which accorded with that given by me in the paper alluded to above in every detail; and Dr. Russell was stated to have suggested the name hæmolympH glands, which I willingly accept, leaving out the prefix, which is superfluous. On seeing this paper, I wrote to Dr. Russell and sent him a reprint of my own; but as I received no answer from him I am unable to say whether he was aware of its existence.

The fact that my observations had been confirmed, and also the presence of these glands in the lower animals being determined, induced me to make further investigations into the subject, especially in various diseased conditions, to see if they were in any way affected.

I have removed all small structures lying in the connective tissue near the renal artery and vein in a number of cases, such as disease of the kidneys, chronic cystitis, stone in the bladder, general tuberculosis, and carcinoma. In all these cases I found these hæmolympH glands, generally more than one on each side. They varied greatly in size, but were similar in structure, and I found nothing to add to my previous description. In addition to these hæmolympH glands I found a number of others. In almost every case there was on each side a gland having precisely the same structure as a supra-renal capsule. They varied greatly in size, but in the larger ones the three zones were shown as perfectly as in the normal gland. In one case this gland measured half an inch across. There were also some small lymph glands of the regular type. In the connective tissue I found some very small nodules, which from their minuteness were difficult to dissect out. These on section were found to consist of large cells with a well-defined nucleus; in some there were only a few of these cells, in others there were thirty or forty in the section. In every case they were enclosed in a delicate capsule so fine that it could only be made out with difficulty. Some of these cells contained a number of brown pigment granules. What they are is not clear. They resemble nothing in nervous tissue with which I am familiar. They have evidently some function, as each collection has a definite blood-supply; further investigation may throw some light on this subject. In none of the cases examined did I find the supernumerary adrenals affected with disease. The hæmolympH glands showed acute inflamma-

tory changes in some instances, but the only cases in which there was actual structural change was in general tuberculosis. The tubercular tissue was well developed and giant cells were numerous, but the tubercle bacillus was absent. It seems to me that this may explain some obscure tubercular conditions, and for that reason is worthy of further investigation.

CLINICAL ASPECTS OF IMMUNITY.

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IN view of the enormous amount of speculation as to the theory of immunity and protection from disease, it has seemed to me to be of some interest to inquire from a practical standpoint, not so much what this immunity is, but what its strength is, its duration after attacks of some of the infectious and contagious diseases, and whether we can find any facts in this study to guide us in the practice of medicine. Even the most ignorant know that of a given number of persons exposed to a contagious disease all are not equally liable to take it. Those who escape when exposed are said to have an immunity against this disease. This immunity may be innate or congenital, or acquired. This innate, or natural immunity, however, is rare; acquired immunity being much more frequent. The latter comes either from a previous attack of the disease, from a protective vaccination or inoculation against this disease, from a prolonged stay in an infected region (acclimation), or from an intra-uterine infection (variola). The object of this paper originally was to try to see if any facts could be reached as to the duration and strength of immunity from a given disease after any one of the conditions above stated; to see if second attacks occurred, and how often; and to bring out any other facts which might be of interest. The results of this undertaking are not in proportion to the work involved, and are chiefly what possibly many already know; they have, however, the advantage of being brought together under one head, and may lead to further investigation in the same direction.

Exactly defined, immunity is that condition of the body whereby it resists the development of infectious or morbid processes, while predisposition is the condition of the body which, by the stimulation of a very slight cause, renders it liable to the attacks of certain diseases, especially to those of hereditary character. Whether immunity is complete or not is a subject which seems not to be decided. It is a common, but

probably mistaken, belief among many that second, and even third, attacks are quite frequent. This belief is not borne out by most authorities. Immunity is strongest immediately after an attack of a disease, and begins to get weaker and weaker until a point is reached where a second attack *may* occur if the conditions are favorable. The duration of this period of protection is very variable in the different diseases, and from the authorities consulted I have been unable to lay down any fixed time for any one disease. It looks as if this protection at times went from parent to child. Fagge says it would be interesting to investigate to what extent differences in the severity of a specific disease, attacking various individuals under the same conditions in countries where it is always more or less prevalent, may depend upon whether one or both of the parents of the several patients had had the disease in childhood, or at least before the patients themselves were born. It might even happen, in the case of a malady which commonly affects adults, that successive generations should in turn succumb to it, in consequence of the continued absence of such an inherited protection. Some diseases, as Asiatic cholera, probably affect a community very much as fire burns over a parched district: it passes over and attacks all susceptible material, and then does not come again until new material has grown up. In this way susceptible persons are gradually weeded out, and in time an immunity is established.

Before looking at the different diseases it may be asked, "Do we have second attacks of the infectious diseases?" We most probably do, but they are not so common as is generally believed. One reason is because there is a great tendency to confuse a relapse with a recurrence. A relapse is a return of the disease before convalescence has been established, while a recurrence is a return of the disease long enough after the first attack to remove the suspicion of its being a relapse. Thus after an attack of acute pneumonia, and even long after the patient is apparently well, the diplococcus of the disease can be found in the contents of the expectoration, and this analogy would hold good in other diseases where the specific organism had not been eliminated from the body, and yet where recovery had apparently taken place. There is probably hardly a physician who could not report an account of a second, or perhaps of even a third, attack of one of the eruptive diseases; but the question is, "Are they really second or third attacks?"

It is undoubtedly true that the frequency of the occurrence of second attacks has been much exaggerated. There are, in the first place, errors of diagnosis, which occur to the busy man as well as to the more inexperienced practitioner; there are the drug eruptions and erythemas which simulate the ordinary exanthematous diseases; there are numerous cases in which the physician has seen but one of these supposed repeated attacks, but has taken the word of the parents or attendants for

the truth of it. Variola is one of the eruptive diseases which generally leaves a mark behind it, so that a careful eye can usually detect traces of it; but the other diseases of this kind (except chicken-pox) leave no mark, and hence it is much easier to assert that they recur, while we know that smallpox rarely occurs more than once. Gerhardt says the eruptive diseases may occasionally recur, especially when the first attack was slight.

To scarlet fever the most attention seems to have been given. Henoch, who is a man of wide and careful observation, is very skeptical as to second attacks of this disease; he says they are very rare, and adds that he has seen but one case of which he was certain. Flint says second attacks of scarlet fever are very rare. Whittaker also says second attacks of scarlet fever are very rare; one attack protects, as a rule. Busey, of Washington, has never seen a second attack of scarlet fever, but has seen repeated assertions of it. Chapin, of New York, with a large experience in children's diseases, says that second attacks almost never occur. Ayer reports three attacks of scarlet fever in the same boy—one attack at five, one at eleven, and one at eleven and one month, the latter looking to me very much like a relapse. He says he at first thought it was simply scarlatiniform erythema, and I think it very likely was. He says he believes in second attacks, but thinks they have so many forms that they are liable to deceive, and it seems to me that they have in this case deceived him. Trojanowsky reports 300 cases of scarlet fever, with 18 recurrences, or 6 per cent.; and of these, 260 were in children, with 15 recurrences, or 6 per cent., and 40 in adults, with 3 recurrences, or $7\frac{1}{2}$ per cent. He believes that there are signs of recurrence being hereditary. In these 18 cases the intervals between the attacks were from six months to seven years. He also believes that recurrences are more common when the first attack was light or abortive.

The general opinion seems to be that measles recurs more frequently than scarlet fever. Trojanowsky and Eiselt report a large number of cases of measles with recurrences. Many attacks of r \ddot{o} theln, or German measles, have undoubtedly been called second attacks of measles, but Atkinson very properly argues that it is illogical to insist upon a diagnosis of r \ddot{o} theln in a doubtful case, because the patient has already passed through one attack of measles. Bartholow maintains that second attacks of measles are very rare, and some authorities say they have never seen second attacks of this disease.

Natural immunity to smallpox is less frequent than in the other eruptive diseases; certain persons are hereditarily refractory. One person in sixty among infants, and one in twenty in adults, are naturally immune against smallpox. Even with inoculation it is said to recur, while by vaccination it is more limited. The length of time a person is pro-

tected after vaccination is generally put down as from eight to ten years, but it certainly varies with the strength of the lymph used, and with the size and manner of the scarification, and other things. Some persons will take the disease when exposed, and yet will not take when vaccinated. History says that Louis XV. of France had smallpox when fourteen, and died from a second attack of it in his sixty-fourth year. Curschmann says that smallpox has recurred as often as five or six times in the same person. Flint says we know no law governing the duration of the protective influence of a single vaccination, and adds that we should be revaccinated every five years. This is probably too often, although Dr. James F. McShane, the Health Commissioner of Baltimore, informs me that this same interval of time is advocated by the Health Office of Baltimore. Layet says that immunity from smallpox by vaccination is transitory, and it is difficult to say how long one is protected. It varies according to the conditions above stated. It is better to let the intervals between the vaccinations be not longer than ten years. About one in every hundred is refractory. In children from six to ten years old, 40 per hundred were vaccinated successfully; 42 per hundred in children from seven to eight; 45.5 per hundred in children from eight to ten; and 44.5 per hundred in children from ten to twelve. At the age of military service, Titeca says that 60 per hundred, and Layet 75 per hundred, were successfully vaccinated. In Germany the statistics for all ages were 94 successful vaccinations per hundred, which seems almost incredible. Immunity wears off very rapidly when the body develops very rapidly and when there is much renewing of tissue; that is, during infancy and adolescence. The proportion of successful vaccinations after smallpox is 24 to 25 per hundred.

E. O. Shakespeare, of Philadelphia, who professes to know something about Asiatic cholera, says it may recur. He says that one attack of cholera confers upon the individual at least a short immunity from a second attack, and for the purposes of prophylaxis the value of this fact should not be underestimated. Other authorities on Asiatic cholera are not in exact accord with this opinion.

Second attacks of yellow fever are very rare, if they occur at all. They may recur when the first attack was early in life, or when the individual has moved out of the region where it is common and has returned to this region in after-life, thus losing the condition of acclimation. The negro race is particularly immune against yellow fever, just as it is particularly prone to smallpox.

Second attacks of typhoid and typhus fever are exceedingly rare.

Some diseases are more apt to recur when they have attacked once, and such are diphtheria, erysipelas, and the ordinary constitutional diseases. In the case of erysipelas, one attack makes the patient more liable to future attacks, but they are generally less severe.

There has always been a question as to whether one can have syphilis a second time, and on that point I have not been able to satisfy myself, for one author will assert that it can never recur, while another will bring apparently good proofs to the contrary. It, of course, in part hinges on the belief whether syphilis is ever cured or not. Taylor reports having seen four authenticated cases of recurrence of syphilis, and Diday has collected forty cases which he is sure are genuine recurrences. This, of course, is a very small number in proportion to the large number of cases which these men had seen. If these second attacks are genuine, it goes to show that syphilis has been and can be cured—a thing which many do not believe.

While not belonging properly to the subject, the question of the concurrence of diseases is interesting. Cases have been reported where two eruptive diseases have occurred at the same time in the same person. These statements must be accepted with grave doubt. Cases in which one disease makes its advent before another has quite faded away may occur, but they should not be confused with those cases of recrudescence in which the disease for some unknown reason returns or relapses just as it is passing away. That one disease may follow closely on another is certainly true. According to Henoch's statements, there seems to be a certain etiquette among the eruptive diseases, possibly due in part to the varying periods of incubation, so that with apparently simultaneous exposure to two diseases one would set in and finish or approach completion before the other would make its appearance. He noticed in his department in the Charité Hospital, at Berlin, that on exposure to two eruptive diseases the child would not take, say scarlet fever, until the first disease, say measles, had almost or altogether disappeared. That is, one disease stood aside until the first one had finished its course. This he observed frequently, and he attributed it to the imperfect condition of the children's ward, which did not sufficiently separate the different diseases.

In looking over the statements made in this paper in connection with the recurrence of certain diseases, it will be seen that it is largely made up of references to the literature. This was done with the object of finding some facts from which definite conclusions might be drawn. I have made the following inferences :

1. Second attacks are by no means so common as is generally supposed.
2. The more marked the signs and symptoms, and the more lasting the effects of the disease, the less often do we hear of second attacks. Measles and scarlet fever leave usually no marks, while smallpox leaves a scar: recurrence of the latter disease is less often claimed.
3. Those who insist on second attacks should assure themselves of the character of the first attack, and not take unreliable testimony.

4. When second attacks do occur, they generally come on long after the first attack, the individual is usually weakened in some way, and the attack is invited by the ingress of a larger number of organisms than would cause a first attack; while such conditions as fear, worry, fatigue, constipation, exposure, debauchery, etc., favor the second attack.

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REVIEWS.

A TEXT-BOOK OF MEDICINE FOR STUDENTS AND PRACTITIONERS. By DR. ADOLPH STRÜMPELL, Professor and Director of the Medical Clinique at Erlangen. Second American edition, translated by permission from the second and third, and thoroughly revised from the sixth German edition, by HERMAN F. VICKERY, A.B., M.D., and PHILIP COOMBS KNAPP, A.M., M.D., with editorial notes by FREDERICK C. SHATTUCK, A.M., M.D. With one hundred and nineteen illustrations. New York: D. Appleton & Co., 1893.

THE medical profession of this country, thanks to the labors of Drs. Vickery, Knapp, and Shattuck, are familiar with Strümpell's text-book and will gladly welcome this new and revised edition. There cannot be too many good books on any subject, and the merit of this one is attested by the fact that it has passed through six editions in Germany. The book has now expanded to 1043 pages. "There is an entirely new chapter on influenza, a disease which had almost been forgotten when the last great epidemic brought it prominently to medical attention. Quite important changes and additions have been made in the chapters on cholera, malaria, diseases of the nose and larynx, syringomyelia, and diabetes. The appendix on poisons has also been considerably enlarged."

One naturally turns to the newer material in order to ascertain how thoroughly the work is kept up to the times, and the result is by no means disappointing, provided the fact is kept in mind that the volume is pre-eminently what it claims to be—a text-book. It is a book much better adapted to the needs of the medical student than any of the ponderous compilations in which each chapter aims to be a complete treatise on the subject to which it is devoted. Monographs are for the post-graduate; text-books for the "student."

There are, doubtless, chapters in which the well-read practitioner would be glad to find more detail. For example, under the head of Pernicious Anæmia, no mention is made of the admirable contributions of Dr. William Hunter to the obscure pathogenesis of that disease. This is the more inexcusable because Hunter's researches must be admitted, even by those who do not accept his conclusions concerning the etiology of pernicious anæmia, to be of great value in *identifying* that affection. The presence of "pathological urobilin" in the urine and the iron-pigment zone in the hepatic acini are features peculiar to this disease, and the student should be made familiar with them.

The book is remarkably free from typographical errors. We would be inclined to regard the word "spirilli" as one of them, but for its frequent use in medical writings. In the next edition it is to be hoped that it will be changed to spirilla, which is the plural of the

modern Latin word spirillum. H. C. Wood is probably intended for C. Wood, on page 940, but we are inclined to question the statement that he was the first to call "attention to the fact that the bone-marrow is almost invariably affected in pernicious anæmia."

The work, as a whole, is excellent, and the few errors which it contains are so trivial as to make it perhaps hypercritical to allude to them. It resembles the work of the late Austin Flint more than any treatise now before the profession, but it is scarcely fair to make the comparison. Our reason for this statement is that Strümpell's *Text-book of Medicine* is a translation, and although the translators have admirably performed their arduous task, they must have been more or less hampered by the original arrangement of words and sentences. It is, therefore, we repeat, scarcely fair to compare a style which, from the nature of the case, must be more or less "labored," with the charming diction of Flint. Strümpell is, doubtless, in the original German what Flint has been, and, we trust, will again be, in English, a model text-book.

F. P. H.

HANDBOOK OF INSANITY FOR PRACTITIONERS AND STUDENTS. By DR. THEODOR KIRCHHOFF, Physician to the Schleswig Insane Asylum and Privatdocent at the University of Kiel. 8vo., pp. vi., 362, with eleven plates and eleven diagrams. New York: Wm. Wood & Co., 1893.

WE know of few treatises on insanity better adapted for the beginner than the work before us. It is both brief and clear, its descriptions of disease are good, its recommendations for treatment are sound, and it is not encumbered with confusing discussions on unessential and obscure points. The nameless translator has condensed the original work somewhat, and has been on the whole very successful in his efforts to put it into readable English.

Fully one-half the book is taken up by the general part. Some of this is hardly necessary. A consideration of the anatomy and physiology of the brain, condensed into a few pages, is out of place in a work of this character, nor is a history of psychiatry a useful addition. For such information the student should be referred to special works; he should know his anatomy and physiology, and be grounded in the elements of regional diagnosis, before he begins the study of insanity. The chapters on etiology, symptomatology, and the course of the different forms of diseases, however, are extremely well done. The chief defect in the work is the insufficient attention paid to pathology. Although metaphysical discussions are for the most part avoided, the author has evidently studied psychiatry from the metaphysical standpoint rather than from the standpoint of the anatomist. Thus he states that "anatomical changes are absent in the majority of cases," and that "mental diseases are not merely diseases of the brain, but diseases of the person." Except in idiocy and paretic dementia, we cannot, of course, determine the form of insanity from the post-mortem changes; but that insanity can exist without some morbid change in the brain is hardly to be believed, and we think it better for the student and more conducive to the advancement of our knowledge of mental disease to hold that position. Even in a treatise like this, the importance of the finer structural changes and

the possible significance of anomalies in development, such as abnormal fissuring, are worthy to be considered.

In the special part, which forms the second half of the book, the first thing which is of interest is the classification. This is extremely simple, and is based solely on the pathology. Forms of insanity without permanent anatomical change are called simple mental diseases—melancholia, mania, paranoia—while a second chapter treats of mental disorders associated with permanent anatomical changes in the brain, or with general diseases—the dementias, idiocy, epileptic and hysterical insanity, etc. Hebephrenia and insanity of doubt are dismissed with a word; katonias receives no mention, and confusional insanity (*acute Verwirrtheit*) is regarded as merely a form of paranoia. Every classification is open to criticism, and the defects of this are obvious, but the most important ones are pointed out by the author himself, so that further criticism seems unnecessary. All classifications being defective, the essential thing is that the descriptions of the individual forms of insanity should be good enough to redeem the defects. In this the author has succeeded. Taking as crucial tests the chapters on paranoia and parietic dementia, the various morbid mental conditions are described in such a way as to give the student a definite comprehension of the patient's mental state. Many valuable suggestions, too, are made in regard to treatment, but, for the most part, home treatment is discouraged. To repeat what we have already said, the work is one to be heartily commended to all students of mental disease.

P. C. K.

REFORM IN TREATMENT OF THE INSANE. EARLY HISTORY OF "THE RETREAT," YORK: ITS OBJECT AND INFLUENCE; WITH A REPORT OF THE CELEBRATION OF ITS CENTENARY. By D. HACK TUKE, M.D., LL.D. Pp. 96. London: J. & A. Churchill, 1892.

THE interesting account given in this small volume of the famous York Retreat is commemorative of the noble work there done for the insane by the illustrious Tukes—William, Henry, and Samuel—to which number may fitly be added the name of the author, whose eminent talent has been of so much service to the cause of these unfortunates. Few events can be more deserving of commemoration than the birth of reform in the treatment of the insane, which has led to their humane care in all civilized countries, and this may be said to have practically taken place with the foundation of the York Retreat. Samuel Tuke's venture even ante-dated a little that of Pinel in France, and although the latter's sudden, complete, and daring removal of manacles, chains, and other forms of restraint at Bicêtre was more dramatic, it was not a whit more effective for the future amelioration of the lot of the insane than the quiet inception, through many struggles and no little obloquy, of the York Retreat. Moreover, while both reformers together inaugurated a new era in the care of these sufferers, the Tukes have been able to keep before the world for a century, by their labors at York and at large, a conspicuous example of the operation of an advanced method, contributing at the same time to the knowledge of its benefits by their writings and influence.

H. R. S.

A SYSTEM OF GENITO-URINARY DISEASES, SYPHILOLOGY, AND DERMATOLOGY. By Various Authors. Edited by PRINCE A. MORROW, A.M., M.D. With illustrations. In three volumes. Vol. I. Genito-urinary Diseases. New York: D. Appleton & Co., 1893.

THE first volume of this work is devoted to the consideration of Genito-urinary Diseases, and among the thirty-two authors who have made their contributions are to be found the names of some of the foremost of American specialists, writers, teachers, and operators. We are not, therefore, surprised to find the greater part of the book practical, instructive, and fully abreast of the times.

It is to be regretted that in some instances the writers, seemingly to condense the work, have abbreviated important subjects, so that much of practical value is eliminated.

The articles to which we especially refer are those devoted to the consideration of the Anatomy and Physiology of the Genito-urinary Organs, Abnormalities of the Penis, Hæmatocle, and Functional Disorders of the Male Sexual Organs. When considering the last-named subject the writer is very practical, but he is not sufficiently thorough to benefit the general practitioner, and he conveys but little information to the neophyte.

Dr. Morrow differs from many authorities in his method of treating spermatorrhœa when complicated with hyperæsthesia of the prostatic urethra. On page 1014 he advises the passage of the bougie "as large as the capacity of the urethra will permit; a congenitally small meatus to be divided if necessary to admit the passage of an instrument 20 to 30 French scale. They should be introduced *every other day*, and allowed to remain from *five to twenty minutes*."

We cannot agree with the writer; the experience of most surgeons teaches that when the patient first comes under treatment the instrument should not be passed more frequently than every third day, otherwise sensibility of the urethra will undoubtedly be increased; the bougie should be considerably smaller than the normal size of the canal, for the reason that if there be hyperæsthesia present even an instrument of small size must cause great pain. It should be at once removed after having been passed. As the sensibility of the canal diminishes the instrument is to be increased in size until the full calibre of the urethra has been reached, and at the same time the intervals between the passage of the bougie should be shortened, when it should be daily inserted. When hyperæsthesia begins to subside the instrument may be retained longer within the canal, the surgeon being guided by the amount of discomfort produced. Ultimately it may be allowed to remain for the space of twenty minutes.

We take exception to the arbitrary directions to enlarge the meatus "to admit the passage of an instrument 20 to 30 of the French scale" as being too indefinite and unsurgical. The operator must be guided by the normal calibre of the urethra, the size of which should be carefully ascertained before any operation is attempted.

The chapter on "Functional Disorders of Micturition" is very attractive and instructive, and the article on the "Diagnostic Significance of Pathological Modifications of the Urine" is a very valuable contribution

to the volume—treating as it does, of subjects not often discussed in works of this kind.

The “Diseases of the Prostate Gland” were very properly assigned to Dr. Belfield, the well-known authority upon this subject. The article is complete.

The chapter on “Diseases and Injuries of the Bladder,” by Dr. George R. Fowler, is a very valuable contribution to the profession. The subject is well condensed and the article is full of information.

The chapter on “Cystoscopy” is useful, timely, and exhaustive, giving the general surgeon precisely the information he needs. We are convinced that many operators condemn the use of the cystoscope because of their want of knowledge as to its proper use.

As might be readily anticipated, the article on “Stricture of the Urethra,” contributed by Dr. J. William White, is clear, strong, and comprehensive. It is gratifying to find such an eminent authority advising a conservative course when treating of stricture, in which he is, indeed, borne out by most operators who have had sufficient experience to warrant an expression of opinion. The performing of meatotomy in every genito-urinary case is very properly condemned. That this operation is indicated in suitable cases, and is at times of great benefit to the patient, there can be no question, but its field of usefulness is limited.

One of the best articles in the book is on “Stone in the Bladder,” by Dr. Cabot. It is concise and progressive. That portion which gives the indications which should lead the surgeon to choose the proper operation to suit the condition with which he has to deal is both an attractive and instructive feature.

The operative treatment of varicocele, by Dr. Keyes, is disappointing. He describes at length the method of subcutaneous ligation devised by himself, and at the same time makes the very remarkable statement in reference to the open operation: “I consider it obsolete, and shall not describe it.” Herein he differs from many of the leading and progressive surgeons of the day, who are publicly advocating the open method and employing it in their private practice. We can hardly understand how he gets the impression that the operation is obsolete; but even if he had not seen fit to recommend it, it seems to us that a method in such frequent use should be fully described in a work of the kind.

The reason urged against its employment is: “I have seen atrophy of the testicle follow the open operation for varicocele in the hands of one of the most competent surgeons in New York.” This seems to us illogical, for if the operation is properly performed, no matter what method is employed, the veins are occluded, and atrophy would be just as liable to follow any method that may be resorted to. We are inclined to think that atrophy would be more liable to follow the mode advised by Dr. Keyes, as he advocates the ligation of the veins in three places, whilst they are tied but twice in the open method. The advocates of the open operation claim that in addition to there being less liability to infection and less pain, the operator can see precisely what he is doing, a great advantage over subcutaneous surgery in these antiseptic days. Orchitis does not follow the open method, and the patient is well within a week. We have performed the operation over fifty times; in every case the patient was convalescent by the sixth day, nor was there any pain, fever, or swelling of the testicle.

We observe that there is no reference made to the device of shortening a pendulous scrotum, when associated with varicocele, by tying the stumps of the veins together after resection.

It is singular that Dr. Wyeth, in his article on "Hydrocele," should advise the almost obsolete method of tapping and injecting the sac in the acute stage of the disease. The usual objection urged against the employment of injections is the great swelling and pain that follow the operation, frequently making it necessary for the patient to be confined to his bed for some ten days, in some cases abscesses forming with their attendant dangers. Then, too, the trouble is apt to recur, when the operation has again to be performed.

No mention is made of the modern treatment by opening the sac, carefully drying and wiping it out, applying carbolic acid, then packing the part with iodoform gauze, and allowing it to remain for twenty-four hours, when it is to be removed and the sides allowed to come together, with a view to obliteration. By following this method the patient suffers no pain, has no fever, is well in from five to six days, and has no recurrence of his affliction. It is applicable to children as well as adults, to double as readily as to single hydrocele.

The work contains a great deal of valuable information, well condensed, and gives the experience of some of the best specialists on genito-urinary diseases.

O. H.

PATHOLOGICAL ANATOMY AND HISTOLOGY. By FRANCIS DELAFIELD, M.D., L.L.D., and F. MITCHELL PRUDDEN, M. D. Fourth edition. Illustrated by 300 plates. Pp. 699. New York: William Wood & Co., 1892.

IN the preface to this work the authors state that it "is intended that the student and practitioner shall find in it the information which they need to enable them to perform autopsies, to preserve tissue, to prepare them properly, and to examine them with the microscope." After carefully reviewing the work we must say that in this the work is a success. It is no easy task to prepare a work of this kind, and describe in full the pathological conditions peculiar to each organ or part, especially when we remember the many peculiar pathological conditions the various diseases produce; and also in this era of progressive medicine, when not each year but each month is marked by the description of some *new* and rare disease, with various theories as to its etiology and pathology. We say *new disease* when possibly it would be better to say *new name*. Yet with all this we find the book replete with all that is new, and yet containing only such statements as have been substantiated by careful research.

In reviewing a book of this size, it would be impossible to comment on each chapter separately—hence only such matter deserving especial mention will be referred to. The chapter on Post-mortem Examinations and recognition of lesions of individual organs is a valuable addition, giving an admirable method of procedure. As we have no method prescribed by law in this country for making such examination, as some foreign countries have, it is well to have some definite method formulated by a standard author.

A valuable addition to this chapter is the description of autopsies in

cases of suspected poisoning, and examination of the bodies of newborn children. This is of special importance in these days, when any physician is liable to be called upon to give *expert* testimony.

The idea of incorporating a chapter on methods of preserving and preparing specimens for study is a good one. The methods given are not so complete as those found in special works on the subject, yet sufficiently so to enable one with a slight knowledge of laboratory technique to make a thorough examination. The plates showing degenerative changes in tissue are especially good and evidently original; in fact, this can be said of all the plates the book contains, and is highly commendable, as it is a deplorable fact that many of the illustrations in standard works are copied from other works. The chapter on Inflammation is good, but in a work of this size we think more space should have been given to the discussion of a process upon which so many pathological lesions depend. The chapter on Animal and Vegetable Parasites, with plates of many forms, also of the infectious diseases, showing micro-organisms of each, we think deserve special mention. While vegetable micro-organisms properly belong to works on bacteriology, yet we think the insertion of those concerned in the production of diseases justifiable.

The classification of vegetable parasites agrees with those given by standard works on bacteriology. While the plates illustrating the micro-organisms of infectious diseases are fine, we cannot understand why so many of the diseases were dismissed with so short an article. Remarkable for its shortness is the chapter on Pyæmia and Septicæmia, although explained more fully in another chapter on Embolism.

The article on tumors, we are glad to note, is a most complete one, giving various hypothesis as to origin—embryonic cells and parasitic—with sections showing the various forms of epithelial or connective tissue growths, both typical and atypical. The classification, though a good one from a histological, pathological, and clinical standpoint, is somewhat confusing to the student.

The consideration of the respiratory system is admirable, especially of the various forms of pneumonia, with plates showing different conditions and stages.

One of the most interesting chapters in the book is the one on lesions found in general diseases, in poisoning, and in violent death. The fact of the many controversies as to the conditions found only proves how variable the conditions under such circumstances are.

When commenting on the opinions embodied in a work of this kind, we must remember they not only represent those of the authors, but also those generally accepted by the profession, while the review represents one man's opinion. While there are a few points which we think could have been made clearer, yet the book as a whole is of such excellence as to long hold its place as a standard work on pathological anatomy.

Generally in reviewing a book an essential feature, *i. e.*, the index, is omitted. This usually being the last of the book to be prepared, is done hurriedly, and many a good book is condemned by its index. Such has not been the case in this work. The index, while not elaborate, is complete.

One cannot read this work without commenting on the clearness of the type, quality of the paper, and its excellent appearance. It is a credit to the publishers.

D. B.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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GASTRO-INTESTINAL ANTISEPSIS.

DR. HENRI HUCHARD quotes Mathieu, that gastric antiseptics is normally obtained by hydrochloric acid, and Cohn has shown that when the gastric fluid contains seventy-hundredths per mille of hydrochloric acid, lactic acid fermentation is arrested, and from fifty- to seventy-hundredths will check acetic acid fermentation. Lavage should be performed either with pure, preferably boiled water, or with salicylic acid, two to three parts; thymol, $\frac{1}{2}$ part; borate of soda, twenty parts; creolin, $\frac{1}{2}$ to one part per thousand. Or hydrochloric acid, or a saturated aqueous solution of boric acid, may be prescribed. Intestinal antiseptics may be obtained by calomel, in fractional doses every hour, particularly in cholera and typhoid fever. Lavage of the large intestine may be carried out by long tubes, or by special apparatus. Various solutions are used—naphthol, tincture of iodine, sulphide of carbon, chlorate of soda, nitrate of silver, tannic acid, boric acid, the latter, according to Bouchard, giving rise to irritation of the large intestine, with elimination of false membranes. The drugs used are charcoal, iodoform, camphor, calomel, salicylate of bismuth, betol, salol, benzonaphthol, and the naphthols. Naphthol irritates the stomach and increases the hydrochloric acid. In renal disease one must use with care the remedies which in decomposition give rise to salicylic acid, as salicylate of bismuth, betol, and salol. The preference is given to benzo-naphthol, which is harmless, the required amount being from seventy-five to one hundred and fifty grains per day, administered in wafers, with about one-fourth of this amount of charcoal. This remedy passes through the stomach without change, and in the intestine is decomposed into naphthol and benzoic acid, the latter being eliminated by the kidneys as hippuric acid. Resorcin has been used in infantile diarrhœa, and in dilatation and cancer of the stomach, and lactic

acid has been recommended in the green diarrhœa of children, although it succeeds equally well in the various diarrhœas of adults. Képhir has a favorable action also by reason of the lactic acid which it contains. The diet is important. Milk, preferably sterilized, often gives brilliant results.—*Revue générale de Clinique et de Thérapeutique*, 1893, No. 22, p. 338.

THE TREATMENT OF LEAD COLIC BY LARGE DOSES OF OLIVE OIL.

DR. COMBEMALE believes that there is a twofold indication in this condition—to clear the intestines and at the same time to relieve the pain. Weil has reported five cases, in which the oil was taken at a dose of a glass, six or seven ounces, each day, the cure following in from three to five days of treatment, and coinciding with the copious stools induced by the oil. But before this event, from the first glass of oil the pains markedly diminished, showing that in lead colic, besides its purgative action, olive oil has an analgesic effect upon the alimentary canal. In these cases not only was the colic cured, but as well the other manifestations of plumbism, as the myalgias, arthralgias, cutaneous anæsthesias, headaches, and vertigos. The four cases reported by the author confirm the opinions given above as to the value of this remedy. If the oil is vomited, three grains of menthol administered in solution, fifteen minutes preceding the next dose, may cause it to be retained. As to the analgesic effect upon the alimentary canal of the oil or the products resulting from its decomposition, neither oil, nor glycerin, nor fatty acids appear to possess this property. The relief of pain appears to be secondary to the real action of the oil. The relief from pain may be either due to simply obviating intestinal obstruction or to removing from the economy the lead in the various forms with which it is impregnated. The first is an undoubted fact, although he is not far from believing that the oil aids in removing from the economy the stored-up lead. It may, with the albuminate of lead, form a compound, insoluble yet saponifiable, which can be with difficulty absorbed from the intestine.—*Bulletin général de Thérapeutique*, 1893, 20e livr., p. 433.

THE INTERNAL USE OF GLYCERIN.

DR. BLANC states that when in contact with the mucous membrane of the digestive tract it has a stimulant, sometimes even irritant effect, due to the presence of oxidation products, as formic acid. In the rectum it excites vigorous contractions which will readily relieve constipation, but it is rarely given alone, generally as one or two dessertspoonfuls in an enema. In large doses it is poisonous; the lesions resulting are those of acute alcoholism, and even the clinical symptoms may resemble those of intoxication. In moderate doses, three or four drachms per day, it aids the digestive functions, increases the appetite, and if taken fasting, relieves constipation. It assists in producing fat. After a time it may give rise to diarrhœa. It is oxidized in the circulation and transformed into its products of decomposition—formic, oxalic, and carbonic acids. It is eliminated as glycerin, when administered in large doses, by the urine within about one hour after taking, and it disappears four or five hours after. As a substitute for fish oils in alimentation it is an incomplete one, according to Fonssagrives. In prescriptions it can replace

syrops. In hepatic colic it is a specific (Ferrand); all remedies which produce intestinal contractions are cholagogues, and it may be able to dissolve concretions of cholesterin and excite contractions in the biliary passages. Of its use in renal lithiasis, Hermann has reported fourteen cases treated by doses of an ounce and a half, repeated several times. In ten cases the success was brilliant, in four there was complete failure. The action appears to be a purely mechanical one.—*Revue de Thérapeutique Médico-Chirurgicale*, 1893, No. 11, p. 294.

SUBCUTANEOUS AND INTRA-VEINUS INJECTIONS OF SALT WATER.

DR. RITTER VON HACKER illustrates the technique with special reference to cholera. Subcutaneous infusion is carried out with a Pravaz's injection, the hands being disinfected by freely washing with soap and warm water, afterward being held a minute in a two per thousand sublimate solution, or a three per cent. carbolic. The usual site chosen is the abdomen, which should be well rubbed with ether by Bonn's wadding, then followed by the above-mentioned solutions. The apparatus should be sterilized by boiling for one-half hour before use and afterward by dipping in a one per thousand sublimate, eighty per cent. alcohol, or a solution of carbolic, for a minute. The trocar used is similar to the instrument of Billroth's for performing thoracotomie. Three forms of reservoir are shown. Cantani's formula is advised and careful sterilization is insisted upon; the quantity is from one to two quarts in from five to ten minutes. Intra-venous infusion requires similar apparatus, with the exception of the needle, which is preferably of glass. Hayem's formula is recommended, two to two and one-half quarts, within a quarter of an hour. This may be considered a surgical operation and requiring more care than the subcutaneous, but it is one that the practitioner should be prepared to meet in a cholera epidemic.—*The Medical Press and Circular*, 1893, No. 2822, p. 581.

THE MANAGEMENT OF TYPHOID FEVER.

DR. JAMES BARR has treated one hundred and three successive cases, with three deaths. In severe cases he uses the tank treatment, which is not described, but seems to be the placing of a patient upon an Ilkley couch in the tank, wrapping the lower extremities in a blanket and applying a hot tin to the feet while the head and body are constantly flushed with a stream of cold water at a temperature of 54° F. He condemns the use of chlorodyne, but has used salol for five years. His favorite antiseptics are salol and salicylate of bismuth, not used with the view of killing the typhoid bacilli, but to lessen intestinal fermentation and irritation; the former is also a good cholagogue. If there is much nervous depression or deficient vascular tone, these agents are combined with caffeine. For offensive exhalations from patients, he uses a spray of peroxide of hydrogen. An abundant supply of milk and farinaceous food, either plain or peptonized, is allowed. To each pint of milk, whey, or other liquid, there is usually added some such combination of salines as the following: bicarbonates of potassium and sodium, of each ten grains; chloride of sodium, ten grains; chloride of calcium, five grains; and occasionally one or two grains of chloride of potassium—which aids digestion

and keeps the blood supplied with its normal saline constituents. If there be constipation, extract of malt will be found useful; if a stimulating effect is desired, beef-tea, mutton or chicken broth, with vegetable juices, but no cellulose; clear soup, beef-essence, kalatina, and coffee may be given, and one or two raw eggs daily during any stage of the disease. Thirst may be quenched at any time with pure cold water, barley-water, toast-water, whey, or weak lemonade. Almost no alcohol is used. During convalescence a good bitter beer is prescribed and also with advantage malt extract in any stage of the disease.—*The Lancet*, 1893, No. 3637, p. 1119.

THE THERAPEUTICS OF DIGITOXINE.

DR. M. MASIVUS has made a clinical study of this, the most active principle of digitalis, which can be obtained of a constant composition. It is from six to ten times more active than digitaline and digitaleine, insoluble in water, and is very irritant. One-fortieth of a grain is dissolved in chloroform, alcohol, and water, and is administered during the day in divided doses, three times daily or every three hours. In cardiac disease, either when compensation is not established, or is insufficiently so, this principle rapidly gives the effects of digitalis; after forty-eight hours the symptoms of asystole diminish, then disappear, the pulse becomes stronger and less frequent, the dyspnœa and cyanosis lessen, the diuresis increases, and the œdema disappears. This dose can be continued for two or three days, often with good results, and without the appearance of any symptom of poisoning or of irritation of the digestive tract. Its action, once obtained, persists for some time. In Basedow's disease the tachycardia is markedly influenced, and after a dose of a twentieth or a thirtieth of a grain the pulse becomes almost normal. In pneumonia and typhoid fever the temperature is lowered and the pulse becomes slower and gains in force. In support of these statements seven cases are cited, illustrated by pulse, respiration, and temperature charts, and in one case by sphygmographic tracings.—*Bulletin de l'Académie Royale de Médecine de Belgique*, 1893, No. 4, p. 359.

THE TREATMENT OF PULMONARY CONSUMPTION.

DRS. C. O. REUTELN and H. ARRONET give their results for the past five years at Poguljanka, from the use of kumyss and creasote. The kumyss was used as a table beverage, from six to fifteen half-bottles daily, about two-thirds of the quantity being taken during the morning. The contra-indications are hæmoptysis and arterial sclerosis. In cardiac incompetence, renal disease, and some forms of gastric catarrh, it was ordered with care, and the quantity lessened, and particularly without the foam, so as to avoid the carbonic acid gas. The creasote was given in pill form with liquorice, in increasing doses from twenty-five to seventy-five grains per day. If not well borne by the stomach it was administered by enema in olive oil. The conclusions are as follows—nearly three hundred patients being under observation: in incipient phthisis, one-half were cured, one-third relieved, only one-fifth remained stationary, and no case was made worse. In chronic cases one-half were improved, nearly as many remained stationary, and about 5 per cent became worse—none being cured. Of the first class, those patients treated by kumyss

alone showed a greater percentage of cases than when creasote was also administered. In the chronic cases not one showed worse physical signs, and while the percentage of improved and stationary physical signs was about the same, a larger percentage of those treated by kumyss and creasote gained in body weight.—*St. Petersburger medicinische Wochenschrift*, 1893, No. 18, S. 161.

STRONTIUM BROMIDE IN THE TREATMENT OF CHRONIC EPILEPSY.

DR. HENRY T. BERKLEY has used this salt in thirty-grain doses, repeated thrice daily, and finds that it is free from impurities, is non-toxic, does not cause an acne, and has a very much lessened somnolent effect; the patients, without exception, are brighter and more cheerful, and, finally, that certain excitable cases are less quarrelsome after a seizure than under the every-day treatment. The character of the seizures is not altered when they do occur, though some of the attendants were of the opinion that the convulsions were lighter. Thirty-six cases were under observation, and show clearly that this salt has claims to considerably greater merit in lessening the number of seizures than its companion, the bromide of sodium.—*Johns Hopkins Hospital Bulletin*, 1893, No. 31, p. 50.

A NEW THERAPEUTIC METHOD.

DR. C. E. BROWN-SÉQUARD presents a very interesting account of this method, which consists in the use of organic liquids extracted from glands and other organs. In 1869 he attempted to establish the fact that all glands, with or without excretory ducts, give to the blood, by an internal secretion, principles which are of great importance, if not necessary. This is the case particularly for the kidneys, the supra-renal capsules, and the sexual glands. In 1889 he found the means for introducing these principles, which consists of injecting under the skin the liquid extract obtained by pressure with the aid of a little water. The innocuity of injections of organic liquid extracts under the skin and in the veins has been established. These organic extracts can be swallowed in some instances—thymus, medulla of bone, thyroid—and their effects obtained. This is not true of the pancreas nor of the sexual glands; the extracts of the latter, however, may be introduced by the rectum with good effect. Organic liquids may be injected through the laryngeal glottis (de La Jarrige). The medical profession owe much to d'Arsonval for the various apparatuses, especially for the filter, which he has contrived for the preparation of these extracts, which are by these means completely sterilized, and are without alteration as regards the albuminoids and soluble ferments. He believes that good effects can be obtained in organic renal affections by injections of the renal liquid, and that in diabetes the use of the liquid extract of pancreas is important. In extensive organic disease of the liver, whether it causes jaundice or not, the hepatic liquid extract should be made use of. This opinion is based upon the fact that the liver also possesses an internal secretion. In the large number of reports of the use of injections of organic liquid from the sexual organs—over sixteen hundred cases under the observation of twelve hundred practitioners—the results have been astonishing. Locomotor ataxia, other kinds of sclerosis of the cord, superficial cancer,

pulmonary tuberculosis, have all been apparently benefited. The use of the thyroid extract has given well-known good results. The use of the organic liquid extract of medulla of bone has been successfully employed in anæmia, debility, and tuberculosis; the cerebral or medullary liquid is of benefit in neurasthenia, locomotor ataxia, and epilepsy; the muscular liquid seems to have great power to give strength to weak muscles. Cardine is a chemical product and not a natural substance, and is not considered here. Héricourt has used serum of dog's blood as a tonic, which is certainly superior to artificial serum, or phosphate or sulphate of soda or other salts. The mode of action appears to be the giving to the blood the principle or principles missing in it.—*British Medical Journal*, 1893, Nos. 1692, p. 1147; 1693, p. 1212.

THE TREATMENT OF SUNSTROKE BY CHLOROFORM NARCOSIS.

DR. KOERFER reports a single successful case where cramps of the back muscles and of those of the calves were so pronounced that opisthotonus resulted, and when unilateral, episthotonus was seen. In addition to the anæsthesia, cold applications were made to the head, chest, and abdomen. The anæsthesia lasted more than an hour, and was followed by the hypodermatic injection of morphine.—*Deutsche medicinische Wochenschrift*, 1893, No. 28, S. 670.

THE SCIENTIFIC TREATMENT OF DIABETES MELLITUS.

DR. GEORGE HARLEY divides diabetes into five classes: 1, hepatic; 2, cerebral; 3, pancreatic; 4, hereditary; 5, food. He begins by putting the organ supposed to be at fault to rights, be it liver, nervous system, or pancreas, and as the liver is the sugar manufactory of the animal body, always take care that the biliary functions are in good working order. Improve the general health by fresh air and healthy muscular exercise short of fatigue. With diabetes the result of excessive sugar formation, as all hepatic cases are, a restricted diet is essential, but the complete stoppage of the saccharine supply is not wanted, for a certain amount of sugar is absolutely essential to the proper performance of the functions of animal life. A healthy man of average weight uses up daily not less than two pounds of sugar, and a non-starchy diet is not intended to prevent the formation of this requisite amount. Fresh milk is preferable to skimmed, and it may be given freely. In cases of diminished sugar consumption—mal-assimilation—not only fresh milk, but cream, butter, and even cod-liver oil should be given freely, and when greasy stools are met with, as in the pancreatic variety of the disease, with the oil should be administered either liquor potassæ or carbonate of soda dissolved in glycerin in order to emulsify the fats. If the loss of flesh and strength be great, do not hesitate to give freely of the most readily assimilable saccharine substances, as honey, pure cane sugar, or lævulose (Kulz). The beneficial action of the saline purgative waters is best seen in diabetes from excessive sugar formation. Alkaline, non-purgative waters are of more value in the diabetes from diminished consumption of pancreatic cases. Only in exceptional cases is the use of alcohol advised—only when weakness and loss of appetite show themselves in cases of diabetes from excessive formation of sugar. For thirst, bland liquids can be used; phosphoric acid seems to

quench the craving for fluids better than anything else. In excessive sugar formation narcotic drugs act beneficially. In diabetes the result of nerve depression, as well as in those arising from pancreatic disease, strychnine is of great service when given as extract of *nuxvomica* in quarter-grain doses with croton chloral. Everything tending to improve the general health, as quinine, phosphoric and nitro-hydrochloric acids, are of service.—*British Medical Journal*, 1893, No. 1691, p. 1097.

INDICATIONS FOR THE ADMINISTRATION OF CHLORALAMID.

DR. T. HOBART EGBERT has used this remedy in more than one hundred cases, and the hypnotic and soporific effects were uniformly gratifying. In preparing patients for operation, of even more importance than the orthodox laxation, is the securing of refreshing sleep and tranquillity of mind. Opiates are excluded from their subsequent depression and digestive disturbances, and many modern hypnotics are likewise inadvisable on account of their marked after-effects. If insomnia is not dependent upon actual physical pain, this remedy is indicated, because it has a tonic action on central nervous cells and fibres, and it relieves intra-cranial congestion. Restlessness, insomnia, and coma vigil, as seen in typhoid fever are indications for this drug, which is best administered in brandy and water, on account of its thus relieving the debility incident to the disease. In the insomnia or fatiguing sleep of nervous prostration, in nocturnal restlessness of excessive mental exertion or emotion, good results are likely to be obtained. The prolonged use of this remedy is not likely to occasion either functional or organic disturbances, nor to lessen its power to relieve. In chorea it should be administered systematically, and best in combination with hyoscyamus and valerian. In the disturbed sleep with unpleasant dreams resulting from alcohol, tobacco, and sexual excesses, it has a special field of usefulness. In mania and melancholia it is superior to chloral and the bromides. It is best administered in extemporaneous elixir, using the elixir simplex of the United States Pharmacopœia.—*Notes on New Remedies*, 1893, No. 1, p. 1.

THE DIET FOR SEVERE GLYCOSURIA.

DR. RICHARD SCHMITZ believes that in severe forms of this condition a strict animal diet is injurious so far as the symptom is concerned, and, as well, fatal to the patient. In three cases reported he used cacao, with milk and saccharine, whole-bread, or a limited quantity of white bread, animal soups, fish, with a limited amount of potato, the usual green vegetables, eggs, and meat. Good Moselle or Bordeaux wine was also allowed. The results were favorable in the reduction of sugar, increase of strength and appetite, and improvement in the general condition.—*Deutsche medicinische Wochenschrift*, 1893, No. 27, S. 648.

THE TREATMENT OF SYPHILIS BY BLOOD SERUM.

PROF. PIERLEONE TOMMASOLI uses the serum from lamb and calf's blood, injected with Tursini's syringe, the quantity varying from thirty to one hundred and twenty mīgims, into the muscles of the nates, the site being cleansed

before and after injection by a 2 per cent. sublimate solution. Thirteen cases are reported. In all cases the manifestations of the disease rapidly disappeared, as is seen under no other method. The average number of injections was six, the largest number thirteen. The constant accompanying symptoms of the injections were fever, pain, induration and swelling at the point of injection, in spite of the sterilization of the fluid. They generally are absent in the first, but appear with later injections and with larger dose are seen inappetence, malaise, and headache. As accidental symptoms are erythema, pallor, weakness, and subnormal temperature. All these symptoms, however, are likely to be transient and of little importance.—*Internationale klinische Rundschau*, 1893, No. 24, S. 889.

THE PREMATURE ADMINISTRATION OF MERCURY IN SYPHILIS.

MR. J. ERNEST LANE protests against the administration of this drug as soon as a chancre shows a tendency to indurate. In such a sore the induration may be inflammatory in its nature, due to the application of irritating substances, and treatment by local means would be followed by healing. He believes it to be more satisfactory to await the appearance of some of the secondary sequelæ, which will render the diagnosis incontestable, and the chances for an eventual cure are improved. When mercury is administered early the secondary manifestations are delayed, but when they do appear they are of a more chronic form and by no means amenable to treatment. These patients are prone to obstinate affections of the mucous membranes and of the iris, and they are liable at a later date to develop symptoms of cerebral syphilis. It is not conclusively proven that the risk of the supervention of tertiary symptoms is in proportion to the severity and prolonged duration of the secondary stage, nor should any attempt be made to abort or shorten this stage. Mercury should be withheld until the appearance of a roseola or some other secondary lesion, and then be promptly and efficiently administered, preferably by inunction.—*Lancet*, 1893, No. 3636, p. 1059.

POISONING BY DIACHYLON PLASTER.

MR. FRANK B. PAPE reports two fatal cases where lead plaster had been self-administered for the purpose of procuring abortion. The symptoms were those of lead-poisoning. The necropsy showed a healthy brain; other organs were normal excepting that the intestines were contracted, and in one case contained a considerable quantity of yellowish, sticky fluid. The ointment, according to the evidence given at the inquest held upon the second case, had been made into pills and swallowed in that form.—*British Medical Journal*, 1893, No. 1646, p. 9.

TOLERANCE OF NITRO-GLYCERIN.

DR. GEORGE EVANS READING reports a case of unusual acquired tolerance to nitro-glycerin. The patient was a woman, fifty-seven years of age, who suffered from vertigo and dyspepsia. The urinary examination showed that she was suffering from chronic interstitial nephritis. One one-hundredth of a grain of nitro-glycerin was ordered before meals, and one-twentieth of a

grain of chloride of gold and sodium after meals. The nitro-glycerin produced its well-known physiological effect. Within three months the patient was taking a grain of the drug in solution. As it was determined to continue the physiological effect, a 4 per cent. solution was made, and later a 10 per cent. solution. In less than a year from the beginning the patient was taking a teaspoonful of this solution, equal to six grains of the drug at each dose, and this amount has been continued. Owing to the acrid character of such a concentrated solution it is necessary to dilute it with from four to six ounces of water before taking, and for this reason the dose has not been increased. The renal symptoms, the dyspepsia, and the vertigo have markedly improved.—*The Therapeutic Gazette*, 1893, No. 5, p. 292.

THE ELIMINATION OF ARSENIC.

DR. EDWARD S. WOOD cites the statement of the books that after medicinal or toxic doses of arsenic the drug is completely eliminated in about three or four weeks. Making use of a more delicate method of analysis of the urine (that of Prof. Charles R. Sawyer) it was shown that in one case that fifty-eight days were required for the complete elimination of twenty-seven minims of Fowler's solution taken during three days. In another case eighty-two days were required to eliminate sixty-nine minims of the same solution. In a third case, when a large toxic dose of white arsenic had been taken in tea, ninety-three days were required for its complete elimination.—*Boston Medical and Surgical Journal*, 1893, vol. cxxviii. p. 414.

The following papers are worthy of notice:

"The Temperature and Treatment in the Various Stages of Cholera," by DR. VOGL, in the *Münchener medicinische Wochenschrift*, 1893, Nos. 24, S. 452; 26, S. 50. Frequent taking of axillary and rectal temperature enables the physician to determine stages and complications, and thus the better to direct treatment.

"What Can We Expect from the Oxygen Treatment?" by DR. E. ARON, in the *Deutsche medicinische Wochenschrift*, 1893, No. 27, S. 645. A review of the literature and theoretical discussion, not entirely favorable to the use of this agent.

"The Treatment of Myxœdema and Cretinism," by MR. G. R. MURRAY, in the *Lancet*, 1893, No. 3637, p. 1130. A single case treated by thyroid extract.

"A Case of Myxœdema Occurring in an Insane Patient," by MR. J. W. ALEXANDER, in the *Medical Chronicle*, 1893, No. 3, p. 175. Treated by fresh thyroid gland, with improvement in the disease and in the insanity, the latter, however, but temporary.

"The Question of Immunity and Blood-serum Therapy against Cholera Infection," by PROF. A. PAWLOWSKY and HERR L. BUCHSTAB, in the *Deutsche medicinische Wochenschrift*, 1893, No. 22, S. 516. Proves that protective material can be preserved, and that it is also harmless.

MEDICINE.

UNDER THE CHARGE OF

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THE SENILE FORM OF MULTIPLE NEURITIS.

AFTER pointing out the dearth of recorded observations on the subject, and referring to original investigations made in conjunction with Siemerling (*Beiträge zur Pathologie der Tabes dorsalis und der peripherischen Nervenlähmung*, *Westphal's Archiv*, Bd. xviii., Heft. 1 u. 2), disclosing the existence of degenerative changes in the peripheral nervous apparatus of old persons, OPPENHEIM (*Berliner klin. Wochenschr.*, No. 25, p. 589) reports the details of two cases of a senile form of multiple neuritis, and refers to four others under his observation. In these six persons (five males and one female), varying from seventy to eighty-two years of age, presenting evidences of arteriosclerosis, and emaciated in greater or less degree, there developed, with slowly progressive intensity, disturbances of motility and sensibility in the upper and lower extremities. The hands and feet were usually affected, and especially the fingers and toes. The affection was invariably insidious in onset. Pain was slight or entirely wanting, but paræsthesiæ, and especially itching, were complained of. There was no elevation of temperature. Objectively, in addition to a condition of general debility, there was found degenerative paresis in the distribution of a number of nerves of the upper and lower extremities. Particularly affected were the small muscles of the hand and in the lower extremities, the peroneal region, and also the tibialis posticus. The palsy was usually but partial. At times it was the more marked in the upper extremities, at other times in the lower; in one case only the lower were involved. The muscles and nerves in the affected regions were sensitive to pressure, but not markedly so. The knee-jerk was wanting in all cases. Sensibility was diminished, principally at the ends of the extremities; there was hyperæsthesia, not complete anæsthesia. The cerebral nerves were not involved. The sphincters also escaped involvement. There was no ataxia. There was slight tremor, which could reasonably be ascribed to the debility of the senile condition. The disease was chronic in course, and manifested a tendency to remission. In two cases almost complete restoration was attained; in a third, decided improvement; in one case aggravation resulted, and in the remainder there was no change. The following are considered to be the characteristics of the senile form of multiple neuritis: (1) The absence of the usual etiological influences—intoxication and infection; (2) the pronounced

chronicity of course; (3) the absence of the mildness of irritative sensory disturbance; (4) the incompleteness of motor and sensory impairment; (5) the freedom from involvement of the cerebral nerves.

ACUTE HEMORRHAGIC NEPHRITIS DUE TO BACILLI COLI COMMUNES.

JEANSELME (*Gaz. hebdom. de Méd. et de Chir.*, 1893, No. 24, p. 281) has reported the case of a nervous and anæmic woman, twenty-eight years old, who, without appreciable cause, was seized six days after the menstrual period with violent pain in the lumbar region, to which nausea and vomiting soon were added. The urine became diminished in amount, and was deeply blood-colored. The pain was increased by pressure in the lumbar region, especially upon the left side, and radiated to the hypochondria, while palpation induced nausea. The patient complained of violent headache and derangement of vision. The face was pale, the eyelids a little puffy. There was, however, no œdema of the lower extremities, the respiration was regular, and the intelligence was preserved. The tongue was heavily coated. The temperature was slightly elevated. The pulse was scarcely accelerated. The urine was passed with difficulty, and was of a brownish-black color, resembling black coffee. The patient was placed upon a diet exclusively of milk. The headache, the nausea, and the disturbance of vision soon disappeared. On the third day the dysuria was still pronounced, micturition, however, becoming more frequent. The oliguria persisted until the sixth day. The discoloration of the urine gradually grew less. The quantity of albumin present was never considerable; a trace remained until the thirty-seventh day of the illness. The urine was of acid reaction throughout. It contained hyaline and epithelial tube-casts, red blood-corpuscles and epithelial cells. Two months earlier the woman had had a precisely similar attack. In the diagnosis paroxysmal hemoglobinuria, malignant disease of the kidney, renal calculi, and ascending nephritis were all excluded. There was nothing indicative of enteric fever. The throat had presented no lesion. The stomach had for a long time been dilated. It was finally concluded that the renal lesion was of hematogenous origin, and bacteriological examination of the sediment deposited by the urine disclosed the presence of the bacterium coli communis.

CHOLERA.

AT the recent Congress for Internal Medicine, held at Wiesbaden, RUMPF (*Supplement to Centralbl. f. klin. Medizin*, 1893, No. 25, p. 2) announced the following conclusions at which he had arrived as the result of his experiences during the epidemic of cholera at Hamburg last year: The comma bacillus must be accepted as the etiologic factor of Asiatic cholera. The presence of the bacillus in the intestine does not, however, necessarily lead to the development of cholera or a cholera-like disease. The presence of comma bacilli in apparently healthy persons suggests that the bacilli may temporarily or permanently lose their virulence. As, however, in the course of an epidemic the same etiologic factor in one case leads to an attack of typical cholera, while in another living comma bacilli may pass through the body without disturbance of the general condition, it follows that for the development of

the disease certain accessory conditions are essential; these must be looked for rather in the individual disposition than in the circumstance of time and place. The last two may, however, influence the individual disposition secondarily. The individual disposition consists essentially in derangement of the digestion, which may result from the ingestion of unsuitable food or from the presence in the intestine of other disease-producing factors. In this connection the massed occurrence of cholera nostras and intestinal catarrh contemporarily with Asiatic cholera is noteworthy. Notwithstanding the presence of comma bacilli in the intestine, cultivation by plating methods may yield negative results for several days. The growth of comma bacilli obtained from the dejections is a variable one. A retardation followed in one instance as a result of therapeutic measures, especially in connection with the administration of calomel and enemata of soap water. A similar result was noted in isolated cases after the epidemic in which, with a condition of undisturbed health, comma bacilli were found in the dejecta. The comma bacilli act essentially by the generation of toxins, which act injuriously upon the intestinal epithelium and upon the kidneys, and exercise a paralyzant influence upon the circulation and the production of heat. The comma bacilli may remain in the intestinal tract of man in an active condition until the eighteenth day, and perhaps longer (on an average until the sixth day). This fact, together with the resultant chronic condition, may account for a portion of the secondary phenomena, and particularly for the comatose stage. There is as yet no specific treatment for cholera, although continued investigations in this direction are certainly warranted.

APYREXIAL TYPHOID FEVER.

DRESCHFELD (Manchester) records four cases of this nature (*Practitioner*, 1893, No. 298). Excepting pyrexia, the symptoms presented scarcely admitted any doubt of the cases being typhoid. There were persistent diarrhœa and hemorrhage, with enlargement of the spleen and roseolar eruption in two cases, and a third ended fatally by perforation. There was a distinct relapse in two cases. "That they ran their course without any pyrexia may, I think, be equally maintained; for, though the temperature was not taken at the beginning of the attack, in two cases it was carefully observed during the relapse, and in all cases the temperature was taken at a stage of the disease when pyrexia is usually most marked, and often at its highest. Nor can the hemorrhage be looked upon as the cause of the apyrexia, for it was only noticed in two of the four cases. It was not very profuse, and only lasted a few days."

GERHARDT (*Charité Annalen*, 1891, p. 208) records seventeen cases, one of which, with relapse, he observed at Würzburg, and sixteen in Berlin. Of these, eight were females and eight males, between the ages of fourteen and forty-four. The onset of the disease in these cases was mostly very acute, commencing with headache, lassitude, vertigo, anorexia, vomiting, and diarrhœa. Insomnia was a prominent symptom in some of the cases. The diazo-reaction was found present in half the cases, and the urine had all the character of febrile urine. Roseola was present in thirteen cases, and en-

largement of the spleen was absent only in two. The loss of body-weight was but slight.

WENDLAND (*Centralbl. für klin. Med.*, 1892, p. 1103) describes two cases of apyrexial typhoid, with marked cerebral symptoms, both terminating fatally, one in the fifth, the other in the second week of the disease, and in both the autopsy confirmed the diagnosis.

DIET IN CHRONIC BRIGHT'S DISEASE.

At a recent meeting of the Royal Medical and Chirurgical Society, WHITE (London) presented the results of investigations made on the influence of various diets upon the composition of the urine and general condition of patients suffering from chronic Bright's disease.

The writer first refers to the opinions of many authors, and points out that they are by no means unanimous as to the best diet for patients with chronic Bright's disease. He next shows that all the *a priori* reasons which have been urged in favor of milk or any other particular diet are fallacious, and that consequently the only way to attack the problem is to carefully observe the condition of the urine and the condition of the patient upon different diets. It is very necessary not to draw deductions from too few cases. He has therefore taken ten cases of chronic Bright's disease in which the urine has been carefully analyzed every day for many weeks, so that altogether between four and five hundred analyses of it were made. In each case notes were kept also of the general condition of the patient. The following diets were tried: Milk, 3 pints a day, containing 1076 grains of proteid. Farinaceous, consisting of bread and milk, containing 1137 grains of proteid. Full diet, consisting of bread, butter, milk, meat, rice pudding, and containing 1522 grains of proteid. Sometimes the effect of adding fish, eggs, or more meat was tried. The following results were reached:

1. Quantity of urine. Usually more urine is secreted upon farinaceous or milk diets than upon full diet.

2. Specific gravity. The diet has no certain influence on this, but on the whole it is lower on milk and farinaceous diets than on full diet.

3. The quantity of albumin passed. The figures show that nearly always the albumin passed is more upon milk diet than upon farinaceous, and less upon full diet than upon either milk or farinaceous. Even in the rare instances in which the maximum quantity is passed upon full diet the excess of proteid in the full diet more than compensates for any extra loss of albumin, so that patients always best avoid loss of albumin by a full diet.

4. The quantity of urea passed. The influence of diet upon this is most uncertain; often less urea is passed upon full diet than upon farinaceous, and less upon farinaceous than upon milk. Sometimes the reverse is true.

5. General condition of the patient. The cases distinctly show that full diet is not more liable to lead to uræmia than any other; in fact, in one patient full diet appeared to ward off uræmia, and the patient ultimately recovered. The patients always felt and seemed much better and stronger on full diet, or on farinaceous diet with meat or eggs added, than on milk or farinaceous only. Many patients loath milk diet and greatly dislike farinaceous; on the other hand, they relish full diet.

The author therefore advises full diet, for it does not lead to uræmia, nor is it harmful in any way; but it saves albumin, the patients like it and improve on it in all respects, while they greatly dislike other diets. If the diuretic effect of milk is desired, plenty of water can be drunk.

QUAIN protested against the indiscriminate use of milk in albuminuria, and recommended the use of mercury in some form or other.

MAGUIRE agreed that the amount of albumin passed was not, *per se*, of any great importance, except in as far as it indicated the extent of the general disease. In the treatment of Bright's disease it was more important to consider the patient's general condition than to concentrate one's attention on the condition of the urine. The condition of the circulation ought to be carefully noted. Provided that were done, he thought the choice of diet might be somewhat modified at the different stages of the disease. There was, for instance, an early stage of granular kidney, or rather a stage which would develop into granular kidney if left to its course—a condition to which Dr. Broadbent had called attention years ago, characterized by a high tension pulse, labored heart-beat, and albuminuria. It would be a mistake in such cases to give the patient *carte blanche* in the matter of diet. In the middle period, a period at which the patient seldom came to the hospital, because he might still be unaware that he was the subject of any serious disease, with high arterial tension and a heart capable of dealing with it—in this stage it behooved the physician to be careful in respect of a full diet. In the later varieties, where the patient was suffering from the effects of the continued high tension, a full diet might be of the greatest benefit in order to enable the heart to cope with its difficulties. Then, too, mercury might be given with advantage to counteract the possible ill effects of the full diet.

BROADBENT thought that the general treatment of chronic Bright's disease ought to be guided mainly by the tension of the pulse and the condition of the heart. He had satisfied himself that uræmia was not due to the presence in the blood of urea or of any specific toxins. It was simply a question of the balance of circulation. It was when the resistance at the periphery overmastered the heart, when they got stasis of the cerebral capillaries, that symptoms of uræmia presented themselves. Considerations of that kind explained what had been illustrated by several of the author's cases, that the remedy for threatened uræmia was not starvation or milk diet, but to diminish the resistance at the periphery, and to increase the vigor of the heart's action, with which object in view a more liberal and a more highly nitrogenous diet was of the greatest possible importance. The question of the influence of diet on the excretion of urea was one of the greatest interest. In all these questions further investigation was necessary, special attention being paid to the character of the motions. He confirmed what Sir Richard Quain had said about the benefit derived from occasional doses of calomel. It increased the hepatic and intestinal functions in a way that no other aperient would do, and it had an effect of its own on arterial tension.

BACTERIOLOGY AND IMPROVED STORAGE OF VACCINE LYMPH.

COPEMAN (London) publishes an interesting contribution to this subject in the *British Medical Journal* (1893, No. 1634). The writer refers to papers

by himself and Dr. Crookshank in the transactions of the Bacteriological Section of the International Congress of Hygiene, London, 1891. To no one of the several bacteria (extraneous) grown in nutrient media from vaccine lymph can be assigned the rôle of vaccine virus. "I have shown, however, that there are three species of micro-organisms, one or all of which are almost universally to be found in every specimen of vaccine lymph examined, of which one—the *staphylococcus albus*—is usually to be found in the upper layers of healthy skin. Of more importance is the fact that in certain cases, though rarely, I have been able to satisfy myself as to the presence of the *streptococcus pyogenes*; and, moreover, it is on record, in certainly one instance at least, that the *streptococcus of erysipelas* has also been isolated from a specimen from vaccine lymph. That untoward results should occasionally, and in certain cases, follow the inoculation during the act of vaccination of one or other of the various 'extraneous' organisms which may be present in the lymph employed is not to be wondered at."

This portion of the problem would be solved if it were possible to isolate the contagion of vaccina (or variola), and to carry on without loss of specificity pure cultures of it in some nutrient media from generation to generation.

From former experiments the writer arrived at the conclusion that the opacity of old stored lymph was in all probability due to the multiplication of the extraneous bacteria; and believing that this activity might, among other effects, inhibit the development of the yet undiscovered organism of vaccine, he directs his attention to the discovery of some method of storing lymph which would prevent this.

"Without detailing the various experiments which were carried out with this object in view, a full account of which I have already published, it is necessary in this place to state briefly the lines on which the work was carried out. In the first place, I made trial of the method of fractional heating, which had, in the hands of Kitasato, met with such brilliant success in the isolation of the bacillus of tetanus. Proceeding in this manner, and in every experiment observing the precaution of making control cultures, I presently arrived at a temperature, exposure to which is apparently incompatible with the continued existence of those micro-organisms which can ordinarily be grown when vaccine lymph is inoculated into nutrient jelly. The required temperature ranged between 38° C. and 42° C.; but whereas, after exposure for an hour at the lower register, a few points of growth are occasionally seen in plate cultivation after the lapse of a day or so, while the higher temperature sometimes appeared to exert an injurious effect on the lymph, as far as regards the normal vesiculation which should result from its inoculation in the living animal, I sought for some method of readier application and requiring less delicate manipulation. This I at length found in the admixture with the lymph of a certain proportion of (75 per cent.) glycerin in distilled and sterilized water prior to storage in capillary tubes, which latter also had been sterilized by heat." Müller showed years ago that the addition of such a mixture did not impair the properties of lymph. Dilution in this way has the additional advantage that the mixture does not dry up readily.

"Experiment shows also that in tubes filled with such diluted lymph opacity does not apparently result. As I have previously stated—an observation, by the way, for which I may fairly claim priority—the glycerin

inhibits the growth of, and after a longer or shorter interval kills off altogether, those aërobic bacteria which I have termed 'extraneous.'

"With the assistance of Dr. Corbett, I have also carried out a series of glycerin experiments on a larger scale, not only with the organisms which can be grown from vaccine lymph, but also with numerous other species of bacteria, both pathogenic and saprophytic, in nature. The details of these experiments we shall hope to publish shortly. I will here merely state that the net outcome of our work appears to show that while some pathogenic organisms remain active in admixtures of broth and glycerin, or even in pure glycerin for longer or shorter periods, other pathogenic, and as far as our experiments go, all saprophytic organisms are killed out in from three or four days to as many weeks."

The article concludes with a reference to the paper on a similar subject published by Dr. Achille Sclavo, of Rome, in which this observer independently confirms the writer's views with regard to the mixture of glycerin to vaccine lymph.

SURGERY.

UNDER THE CHARGE OF

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PYLOROPLASTY FOR NON-MALIGNANT STENOSIS OF THE PYLORUS.

GOULD describes (*The Lancet*, 1893, vol. i., No. 20) the case of a woman aged fifty-eight years, who for more than twenty years had suffered severely from dyspepsia. She had one severe attack of peritonitis, involving the upper abdominal zone. Although very hungry, she was able to eat but very little. All kinds of fluid made her sick. There were frequent attacks of vomiting, when large quantities of undigested food would be rejected. The stomach was much dilated; the bowels were constipated. The patient was wasted to an extreme degree. No tumor was to be felt in the abdomen. Lavage and rectal feeding had not afforded relief. The symptoms were thought to be due to non-malignant stricture of the pylorus, or to pressure from adhesions.

An exploratory laparotomy was performed, and an incision made into the stomach. The pylorus was examined with the little finger and found to be contracted to the size of a goose-quill. The incision was then prolonged through the pylorus and into the duodenum, until it measured two inches or

more. The wound was held widely open by two blunt hooks placed in the middle on either side, and then sewn up transversely with two rows of fine silk sutures. Recovery was rapid and satisfactory, and five months later the patient was "well."

The author prefers this operation to the divulsion of the pylorus as advised by Loreta. He believes pyloroplasty to be safer and to be more likely a permanent success.

Preparatory to the operation the patient's stomach was washed out with a 2½ per cent. solution of salicylic acid. As a consequence, the patient suffered severely from poisoning by this drug. The author warns surgeons against this proceeding.

Pyloroplasty has been performed in twenty-two cases, in addition to the one just reported. Sixteen of these recovered, five died, and in two the result was not stated. This gives a mortality of 25 per cent. The mortality after Loreta's operation is given by Greig Smith as about 40 per cent.

APPENDICITIS: AN ANALYSIS OF SIXTY-EIGHT CASES.

BARLING reports (*British Medical Journal*, 1893, No. 1686) sixty-eight cases diagnosed as typhlitis, perityphlitis, or appendicitis, collected from the records of the General Hospital, Birmingham, for the past seven years.

Seven of the number died, a mortality of 10.3 per cent. The mortality is perhaps lower than actually occurs, as some of the cases were so mild that they might be excluded as being doubtful.

In forty instances a well-marked tumor could be palpated in the right iliac fossa. In some others palpation was unsatisfactory on account of the extreme tenderness and rigidity of the abdominal walls. In the most acute perforative cases tumor is only once mentioned, while of the forty cases having a well-marked tumor in the right iliac region, but four developed abscesses. Only twice were redness and œdema noted; one of these recovered without suppuration. The other case had a well-defined abscess following perforation of the cæcum. In three of the four patients with abscesses, redness and œdema were absent. In but two of these could fluctuation be detected.

Five of the sixty-eight cases relapsed, three of them twice, one three times, and one four times. Four of these finally apparently fully recovered; the fifth was operated on and died. This was, however, before the adoption of the present technique in abdominal operations.

Of the seven fatal cases, one died from a perforation of the cæcum; in the others the appendix was the starting-point of the trouble in every instance. Peritonitis was the cause of death in each case.

The author classifies the cases that require operation under three heads:

1. Those in which pus can be diagnosed with something like certainty.
2. Those in which, from the acuteness of the symptoms, perforation or gangrene of the appendix may be regarded as imminent, if it has not already occurred; and
3. Those in which prolonged rest, blistering, etc., fail to prevent relapse.

It will be understood, of course, that these indications apply to classes of cases rather than to individual cases, each of which must be carefully studied and treated as seems indicated.

The most serious cases are included in the second class. These will need the most careful watching.

ENTERECTOMY AND ENTERORRHAPHY.

IN the *Dublin Journal of Medical Science*, 1893, No. 258, FRANKS reports three cases upon whom he performed resection of the bowel, followed by immediate suture.

The first patient was operated upon for an abdominal tumor, which proved to be a cylindrical epithelioma about the size of the fist, growing from the hepatic half of the transverse colon. Five inches of bowel, including the growth, were resected, and a triangular segment of the mesocolon removed. The edges of the latter were stitched with interrupted catgut sutures, and the divided ends of the colon united by Gély's suture, fine silk being employed, and the peritoneal and muscular coats only transfixed. Each suture was knotted as it was passed. At the time of the report, four and one-half years after the operation, the patient was in perfect health.

The second patient was a man forty-eight years of age, who was suddenly seized with symptoms of intestinal obstruction. An exploratory laparotomy was performed, when it was discovered that a volvulus of the small intestine existed, the bowel already being gangrenous. Sixteen inches were resected, and the operation completed as before. Apparent improvement occurred, but at the end of thirty-six hours evidences of obstruction developed, and death occurred two days after operation. At the autopsy it was found that the intestine below the seat of operation was becoming gangrenous. Firm old blood-clots filled the veins of a large portion of mesentery, and the portal vein was almost occluded by the same condition. This was in no way chargeable to the operation, but was responsible for the death.

Unusual interest, it seems to us, is attached to the third case on account of the opportunity given to examine the wounded intestine five weeks after operation. A woman, aged thirty-six years, was brought to the hospital on account of a strangulated umbilical hernia. It was necessary to resect nine and a quarter inches of the bowel, as its vitality was destroyed; the operation being performed as in the first case. At this time an ovarian cyst as large as a fetus at term was discovered, but it was considered wise not to add to the gravity of the operation by removing it.

The patient made a satisfactory convalescence after the resection and suture of the intestine, and at the end of five weeks she was thought to be in such a satisfactory condition that the removal of the ovarian tumor could be safely performed. Accordingly this was done, and an opportunity thus afforded of inspecting the bowel. The line of union was so perfect that "it was impossible to detect it with the naked eye," but it could be recognized by touch. "Not even a contraction or depression on the surface marked the line of suture." The utility of this operation is thus fully demonstrated. The patient recovered satisfactorily from the second operation, and six months later was perfectly well.

The author urges suture of the intestine, after resection, in cases of gangrenous hernia, in preference to the formation of an artificial anus, as having a much lower mortality, and being in every way the more ideal operation. The mortality following the establishment of an artificial anus in these cases

is given as 80.7 per cent., while in 222 cases of resection and suture collected by Franks the death-rate was but 48 per cent.

THE SELECTION OF THE POINT OF PUNCTURE FOR IODOFORM INJECTIONS IN TUBERCULOUS DISEASE OF THE HIP-JOINT.

VON BÜNGNER expresses (*Centralblatt für Chirurgie*, 1892, No. 51) his conviction of the anti-tuberculous value of iodoform. The contributions of Wendelstadt, Krause, Bruns, and others, have clearly shown the value of iodoform in tuberculous affections. The application of the remedy is in many locations a simple matter, but with the hip-joint this is not the case. The author has, therefore, been led to make a series of experiments to determine the best method of reaching this joint.

Krause, after experimenting on cadavers, concludes that injections into the hip-joint can best be made with a trocar seven to nine centimetres long. The patient lying flat on the back, the puncture is made close above the trochanter major, midway between its anterior and posterior surface, exactly in the line of the axis of the thigh. The needle should be pushed slowly forward until bone is felt. In no case must the leg be abducted nor rotated externally, as it would thus be easy to come in contact with the acetabulum. Flexion is to be avoided throughout. The best position of the limb is adduction and slight internal rotation. When the point of the trocar comes in contact with bone (the head or neck of the femur) the thigh is adducted as much as possible and the trocar advanced, keeping close above the bone until bony resistance is felt. The instrument will then be in the joint cavity between the head of the femur and the border of the acetabulum. After the stilette has been removed the canula is advanced a little, and the injection may then be made.

In practice, v. Büngner has found this method not always easy of execution, and he was in doubt whether or not the instrument really entered the joint. In some cases the resistance was so great that considerable force was required to introduce the trocar; again the position advised cannot be obtained in many cases, but the great disadvantage was the uncertainty about reaching the joint.

Küster's plan seems much simpler and better to the author, and he has employed it for the past three years. By palpation the point at which the femoral artery crosses the horizontal ramus of the pubis is determined. From this point a line is drawn to the trochanter major. The puncture is made directly into the joint at the inner border of the sartorius muscle, in the line thus determined. This is the shortest and most direct way to reach the hip-joint; at this point the capsule is thinnest, and in thin persons the round head of the femur can be felt in this situation. As the capsule extends from the border of the fibro-cartilage of the joint to the oblique line of the femur, a little deviation of the needle will not result in missing the joint. There are no important structures to wound in this puncture.

The author injected twenty-five cadavers of both sexes and of different ages, one side by Krause's method, and on the other as recommended by Küster, following the rules given above. He used blue gelatin mass and a Pravaz syringe with a canula seven centimetres long, injecting ten grammes in

each case. The joints were opened by v. Langenbeck's incision. In the twenty-five injections made as advised by Krause, the joint had been missed six times. In all these six cases the mass had collected around the upper lateral external surface of the capsule. In nineteen instances the injections had been successful, but the mass had adhered to the upper anterior and posterior surface of the head and neck of the femur, while the lower part and the acetabulum were free. In the injections made by Küster's plan there was not a single case of failure, and the distribution of the mass throughout the joint was uniform. In this method the position of the thigh is a matter of indifference. The reason injections of iodoform have been so successful in disease of the wrist-joint and so unsuccessful in the hip-joint is explained by the fact that in the former the joint has been reached, while in the latter the fluid has not entered the joint in many cases.

v. Büngner employs the 20 per cent. iodoform glycerin mixture, and prefers to inject with a Pravaz syringe having a long thin trocar. He injects five to ten grammes at intervals of from two to four weeks. The joints are not irrigated unless there had been considerable fluid present, and passive movements and massage are not to be employed, as metastasis may thus be caused.

THE SCLEROGENOUS METHOD OF TREATING WHITE SWELLING.

DESGUIN states (*Ann. et. Bull. de la Soc. Méd. d'Anvers*, September, 1892) that no method of treating recent white swelling is comparable to the sclerogenous method of peripheral injections, a cure being obtained on an average in a period of six weeks. Motion is preserved, in contra-distinction to the old methods which aimed at ankylosis. In joint trouble with suppuration, the treatment restricts the tuberculous process and places the joint in the most favorable condition for surgical interference.

Whatever may be the age of the lesion, the treatment is followed by rapid and considerable diminution in the pain. The joint which has been cured is not more liable to a fresh attack than others.

THE FIXATION OF WANDERING KIDNEY ON THE ANTERIOR SURFACE OF THE QUADRATUS LUMBORUM AND ON THE DIAPHRAGM.

RIEDEL, being dissatisfied with the usual methods of dealing with wandering kidney, describes (*Berliner klinische Wochenschrift*, 1892, No. 28) the method which he has devised:

The usual oblique incision is made, the lateral border of the quadratus lumborum is exposed, then the fat, and finally the posterior part of the capsule of the kidney is split in its whole length, and dissected up so that the kidney is free. It is then placed up under the diaphragm until its lower surface only is seen in the wound. The median border of the capsule is stitched to the quadratus with deep catgut sutures; on the lateral side the peritoneum and subserous fat are everted as far as possible and sewed. The lower part of the kidney is now fixed, but the upper part is free. The kidney is secured in position by gauze tampons, to be particularly packed in the former site of the kidney. The wound is stitched and dressed. The first

dressing is allowed to remain one month when possible, when the wound is pulled apart and the gauze removed.

Of six cases operated on, five remained free from recurrence at the end of a year and a half.

THIOPHEN-DIIODIDE AS A DRESSING FOR WOUNDS.

ZUCKERKANDL contributes the following in the *Wiener medizinische Presse*, 1892, No. 49, on this substance. It consists of thiophen, in which two atoms of hydrogen are replaced by two atoms of iodine. It crystallizes in beautiful plates, is insoluble in water, but soluble in ether, alcohol, and chloroform. Impregnated in gauze it has an agreeable aromatic odor. Spiegler claims that it prevents the growth of most micro-organisms. The specific germs of typhus, cholera, and anthrax, and the streptococcus pyogenes are very sensitive to this substance, as are also the staphylococcus aureus and pyocyanus. In the body, thiophen-diiodide is decomposed with the liberation of iodine, which may be detected in the urine.

It has been used on gauze—10 to 20 per cent.—and also in sticks. Hock prepared gauze by dipping it in a solution of thiophen-diiodide in alcohol and ether, with a little glycerin. It has been employed in all forms of infected wounds, and in those difficult to keep sterile on account of their location. Healthy granulations formed more readily than with iodoform. There was never any evidence of intoxication, nor of local irritation; it even acted well in cases where eczema had been produced by iodoform.

The agreeable odor, non-poisonous and non-irritating properties recommend the drug for further trials.

THE TREATMENT OF EMPYEMA BY BÜLAU'S ASPIRATION DRAINAGE.

AUST reports (*Münchener medicinische Wochenschrift*, 1892, No. 45) thirty-three cases of empyema treated by aspiration-drainage at the Altona City Hospital. The necessity for operating in cases with purulent collections in the thorax is not questioned at this time, but the best manner of operating is still under discussion. Bülau first advocated aspiration drainage, and later Jaffé also advised this method.

Of the thirty-three cases reported by the author, eleven were clear cases, without other disease and without complication. All recovered save one; this case was a woman, seventy-five years of age, with general senile degeneration. The average duration of this treatment was 27.4 days; the shortest period was 3 days, and the longest 80 days. The average time of treatment of all cured cases (except those of tuberculous origin) was 37 days. These results equal the best records of more radical measures.

Immermann reports 86 per cent. of complete cures by this method; 9 per cent. needed a second operation to close the fistula, and 5 per cent. died. Bohland had recently published three cases, making in all seventy-one cases of undoubted empyema. Four, or 5.07 per cent. died; five, or 6.34 per cent. needed subsequent operation; sixty-two, or 88.59 per cent. were cured.

The result of all cases, without regard to etiology and complications, is much less favorable, the figures being: cured, 52 per cent.; improved, 18 per cent.; died, 30 per cent. The objection to the method is, of course, that

the permanent drainage may give entrance to other microbes, and thus give rise to a mixed infection. This is to be avoided by very careful antiseptic dressings and by employing a tube that completely fills the opening.

TOTAL EXTIRPATION OF THE TONGUE, AND ITS EFFECT ON THE SPEECH.

AF. SCHULTÉN (*Deut. Zeitschr. f. Chirurgie*, 1893, Band xxxv., Heft 5 u. 6) opposes the teaching of Louis, Butlin, and most other writers, who hold that the loss of the tongue has little or no effect on the speech. In partial extirpations of the tongue it is true that articulation is but little interfered with, but it is a very different matter when the tongue is completely removed. Jussieu's case, in which there was congenital absence of the tongue, and yet speech was not interfered with, does not contradict the statement just made. In this instance the condition was physiological, and, besides, the tongue was represented by a nodule; the muscles at the base of the tongue having a certain degree of development.

The author reports the case of a woman, thirty-two years of age, whose tongue had been partially removed for sarcoma, and totally extirpated later on account of a recurrence. Although her companion could understand her after the second operation, Schultén could not. The patient was obliged to construct a different language, substituting sounds she could make for those that were lost. Articulation was, of course, impossible.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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ASEPSIS IN OPERATIONS ON THE EYES.

NUEL, in *Le Mercredi Medical*, 1893, No. 20, discusses the means by which this is to be attained, and points out the narrow limits of the power of chemical disinfectants. By their aid alone neither sterilization nor complete asepsis is possible. The alkaline reaction of the humors of the eye is unfavorable to the efficiency of the stronger chemical antiseptics. The principal function of these agents is to oppose the development of pathogenic bacteria and diminish their power of resistance to the destructive influence of the normal tissues upon them. Even upon the outside of the eye, the most efficient solutions are too irritant to be used freely with safety.

The sterilization of the skin is to be attempted by thoroughly washing with soap, followed by a solution of corrosive sublimate or similar antiseptic, special care being taken to cleanse the margin of the lids.

Within the conjunctival sac he employs a sublimate solution of 1:2000, rarely more diluted, although 1:3000 and 1:5000 are quite active. The thorough cleansing of the eye is to be repeated three or four times a day for two or three days preceding the operation, where this is practicable, and a final cleansing constitutes the first step of the operation.

For the sterilization of instruments the chemical antiseptics are unsuitable on account of their corrosive action. The best method is by boiling in hot water, or in a solution of sodium carbonate, $1\frac{1}{2}$ or 2 per cent. For instruments that do not stand this heat a 1 per cent. solution of cyanide of mercury is recommended.

As an after-dressing he depends on covering the parts with antiseptic gauze; he does not employ the instillation of powdered iodoform or aristol, believing that their advantages do not compensate for the presence in the conjunctival sac of a bulky foreign body.

TOXIC AMBLYOPIA FROM IODOFORM.

PRIESTLEY SMITH (*Ophthalmic Review*, 1893, No. 138) reports the case of a man, aged thirty-one, suffering from chronic tubercular pleurisy and peritonitis. He was placed on the internal use of iodoform, the dose being increased until he took thirty-two grains a day in pill form. He took altogether about one thousand grains in forty-one days, when the drug was stopped on account of toxic symptoms, especially amblyopia. In both eyes there was slight haziness of the margin of the disk. Vision was greatly impaired, with an absolute central scotoma for white and a scotoma for red larger than is commonly found in tobacco amblyopia. The loss of vision began a day or two before the iodoform was stopped. Re-examination, seven days after this, showed the haziness of the disks rather more pronounced, but the vision had already begun to improve. Four weeks later he had small absolute scotoma involving the fixation point. Vision of the right eye 6/XXXVI., left 6/XXIV. Subcutaneous injections of strychnia, and iron and strychnia by the mouth were given, and at the end of three months from the onset of amblyopia, vision was 6/VIII. in each eye, and no scotoma could be found.

The amblyopia was associated with headache, giddiness, faintness, constant taste and smell of iodoform, twitching of the hands, emotional depression, change of the urine from high acidity to alkalinity; and, after the iodoform was stopped, slight ptosis and great drowsiness, succeeded by irritability. There were also numbness and tingling in the legs, and the knee-jerks were increased. The patient had been a regular smoker before coming under treatment, but had only smoked once in the seven weeks preceding the onset of the amblyopia, and during the period of recovery he resumed smoking, so that causation by tobacco could be excluded.

Hirschberg reported a case in which iodoform was used as a dressing after a hip-joint operation, and Hutchinson one in which the patient had taken daily for six months nine grains of iodoform and six grains of creasote in pill form.

HOP-PICKERS' OPTHALMIA.

ADAMS (*British Medical Journal*, 1893, No. 1688) describes a form of ocular inflammation occurring in the latter part of August and throughout the month of September among hop-pickers. It is marked by the signs of acute conjunctivitis, such as commonly arise from severe mechanical irritation. In some cases the nutrition of the cornea is so impaired that necrosis results; acute keratitis and hypopyon are not uncommon complications in the more severe cases. In one case a concurrent affection of the nasal mucous membrane was noted. It occurs chiefly in women and children, who do most of the picking, and is confined to persons actively engaged in the hop industry.

Careful inquiry showed that it was not due to any catarrhal cause or general unfavorable hygienic conditions. In some cases it is distinctly ascribed to the rubbing of the eyes with hands soiled with hops. Those who do not come into such close contact with the hops escape.

Careful investigation seems to show that it is not caused by any irritant used in the cultivation of hops or by the chemical constituents of the plant. The hop plant, however, belongs to the same family as the common stinging nettle, and on microscopic examination its bracts, leaves, and bines are found covered with thorn-like, hairy particles, these being largest and coarsest on the bines. This latter fact seems to explain the prevalence of the disease during the hop harvest.

The probable mode of causation of the inflammation is by the carrying of some of these irritant spines to the eye, where they become impacted in the conjunctiva and cornea; and their irritant effect is probably increased by the volatile and resinous matters of the hop itself or the micro-organisms which they may carry.

The treatment is that of an ordinary traumatic conjunctivitis, with special attention to cleanliness, rest of the lids, and exclusion of light.

HEMIANOPSIA AND OPHTHALMOPLÉGIA, WITH PARTIAL RECOVERY.

WÜRDEMANN and BARNES (*Archives of Ophthalmology*, 1893, vol. xxi., No. 2) report the case of a man who had suffered from chronic malarial poisoning followed by general anæmia. His sight, previously good, had suddenly been impaired by loss of the temporal halves of both fields of vision, probably due to a circumscribed hemorrhage at the anterior portion of the optic chiasm. There was subsequent improvement, but partial atrophy of the optic nerve remained. After this a central scotoma developed in both eyes, increasing until axial vision was abolished. Central vision then returned, leaving contracted color fields.

Later, after an attack of dysentery, he suffered from right homonymous hemianopsia, accompanied by paralysis of the left internal rectus muscle and left ptosis. This attack was probably due to hemorrhage along the left optic tract and the third nerve of the same side. This was again followed by recovery, except for the absence of the centre of the field of vision for red.

The authors regard attacks of hemianopsia, and the distinct apoplectic seizures that accompanied them, as due to miliary aneurisms engendered by the prolonged general anæmia.

INTRA-OCULAR TUMORS.

LAWFORD (*British Medical Journal*, 1893, No. 1659) points out that these growths have heretofore been regarded either as sarcomata springing from the choroid, or glioma of the retina. He believes that such classification is sometimes erroneous, that a small number of these tumors belong to the epithelial type, and that the number of such is larger than appears from published records.

The difference between sarcoma and carcinoma in typical specimens is known to all, but every one has occasionally found difficulty in deciding upon the nature of atypical growths. There is no reason why tumors of the epithelial type should not originate within the eyeball, and some *a priori* grounds for expecting their occasional development. The intra-ocular carcinomata belong chiefly to the small group of melano-carcinomata, the rarity of which may have increased the tendency to consider all primary choroidal tumors sarcomatous.

The prognosis for sarcoma and glioma has been fairly worked out, but as to the carcinomata originating within the eye it has yet to be determined.

THE INTERRUPTED BLOOD COLUMN SEEN IN THE VESSELS OF THE EYE.

FRIEDENWALD (*Ophthalmic Review*, 1893, No. 140) discusses the phenomena which is observed in embolism of the central artery of the retina, in simple glaucoma with great interference with the retinal circulation, in the retinal veins at death, and in veins of the conjunctiva and cornea whose lumen is very much greater than that of the corresponding arteries. The appearance is that of red masses, stationary, or moving slowly along the vessels, with colorless intervals.

By microscopic examination it is found that this appearance is due to the fact that the red blood-corpuscles are collected into masses, and the space between these masses is occupied by blood plasma and white corpuscles. This fact forces the conclusion that there is a cohesive attraction between the red blood-corpuscles which naturally manifests itself only when the blood current is very slow.

SKIN-GRAFTING AS A SUBSTITUTE FOR TRANSPLANTATION OF THE CONJUNCTIVA.

HOTZ (*Annals of Ophthalmology and Otology*, 1893, vol. ii., No. 2) has used Thiersch's skin-grafts for the relief of extensive adhesions of the lower lid to the eyeball, following destruction of the conjunctiva by lime and hot metal; for excessive shrinkage of the conjunctiva in trachomatous eyes; to enlarge a contracted socket, and make possible the insertion of an artificial eye; and to fill the gap left by the removal of a large pterygium. Although the implanted scales do not gain the structural character of a true mucous membrane, they do become as smooth and soft as the surrounding conjunctiva, and differ from it only by their opaque whitish color.

Their transplantation is comparatively simple, and usually crowned with success; while the transplanting of mucous membrane is very tedious, and the results usually anything but satisfactory.

OBSTETRICS.

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 PARASITIC FŒTUS.

PINARD reported (*Congrès Français de Chirurgie*, 1893) a case of parasitic fœtus included under the skin of the neck of a new-born infant, and forming a large tumor. Its walls permitted the recognition of fœtal extremities. It was removed by a circular incision and amputation after ligation. The operation was a success. The parasite was almost perfect.

 THE RELATION OF TUBAL DISEASE TO ECTOPIC PREGNANCY.

LAWSON TAIT (*Medical Press*, 1893, p. 506) relates a curious case extracted from the *Philosophical Transactions* of the Royal Society of London, 1741, where a woman with an unusual history of pregnancy, presumably ectopic, had abdominal section performed on her by a butcher, who extracted through the wound the perfect skeleton of a fœtus and several pieces of putrefied flesh. She made a good recovery save for an umbilical hernia. The author gives it as his opinion that normal impregnation can never take place in the Fallopian tube. In pathological cases in which this happens it has been proved beyond a doubt that it is the result of ciliary desquamation, and per contra, that when the epithelium of the tube is perfect, it is a bar to tubal gestation.

In the above article is a very interesting description of the anatomy of the broad ligament showing the various ways in which rupture may take place.

 SYMPHYSIOTOMY.

EKSTEIN (*Centralblatt für Gynäkologie*, 1893, No. 19) reports the following case of symphysiotomy with fatal termination.

A woman, forty years old and pregnant for the first time. The pelvic measurements were as follows: iliac spines, 22 cm.; iliac crests, 28 cm.; trochanters, 31 cm.; conjugata externa, 17 cm.; conjugata diagonalis, 10½ cm.; conjugata vera, 8 to 8½ cm. Patient had been in labor three days when operation was done. Hemorrhage from subcutaneous tissue considerable. The symphysis was separated by means of a herniotome and was incised to

the depth of 1 cm., which did not cut through it entirely. After incision the joint separated $\frac{1}{2}$ cm. Forceps applied in the right oblique diameter. After the third traction was made on the fetal head the remaining portion of the symphysis separated with an audible sound. The pelvis was artificially protected on both sides, and the child delivered without trouble. Symphysis separated about 4 cm. during the delivery. Symphysis united by silk sutures and fixed by means of an Esmarch rubber bandage. There was complete rupture of the perineum. Immediately after coming from under the chloroform, patient showed unfavorable symptoms and died three days after from acute degeneration of the heart muscle. Paralysis of the rectum was present. Symphysis was in good process of healing. The author does not consider symphysiotomy, with proper assistance, a difficult operation, but believes that the joint should not be completely separated.

THE DURATION AND STRENGTH OF UTERINE CONTRACTION IN RELATION TO THE INTER-CONTRACTILE PERIOD.

WESTERMARK (Stockholm) (*Centralblatt für Gynäkologie*, 1893, No. 21) in a number of investigations on the activity of the human uterus in normal birth, demonstrates the following interesting facts:

1. The average duration of the interval between the pains (Wehenpause) was 132.4 seconds (maximum, 105–525 seconds; minimum, 10–150 seconds; mean, 66.7–392.6 seconds); they are greatest in the beginning of the period of dilatation. From this time they decrease until they attain their minimum during the period of expulsion.

2. The intra-uterine pressure during the interval between pains was registered in the plane of the pelvic inlet, and depends: *a.* Upon the intra-abdominal pressure. *b.* Upon the difference in level between the pelvic inlet and the highest point of the uterus. *c.* By the tension of the uterine wall, which tension is settled by the strength of contraction of the uterine muscle and by the volume of its contents.

The intra-abdominal pressure depends upon: *a.* The activity of the abdominal pressure; during the interval this is frequently increased or diminished by coughing, vomiting, etc. *b.* The stretching of the abdomen in consequence of accidental causes, as gas in the intestines, etc. It also varies with the *position* of the body.

As long as the volume of the uterine contents remains the same the intra-uterine pressure is unchanged from one interval to another. When the rupture of the membranes occurs a decrease of this pressure takes place in consequence of a lessening in the uterine contents.

3. The pains reached their maximum on an average in 25 to 30 seconds; the acme of the maximum was reached in 8.1 seconds; from which time they gradually decreased. The higher the intra-uterine pressure the greater the pain. Combined and double pains with pseudo-pauses, were frequently registered, but no peristaltic action of the uterus could be detected.

4. The average of the frequency of the pains was one in 4.23 minutes; they were small at the beginning of the period of dilatation and gradually increased until they reached their maximum at the end of the dilatation and during the period of expulsion.

5. The duration of the pains averaged 69 seconds, and were in relation to the pause as 1 to 2.

PELVIC CHANGES CAUSED BY COXALGIA.

BRUNCEAU (*Centralblatt für Gynäkologie*, 1893, No. 21) in an investigation of a number of pelvis in persons affected with coxalgia finds that the pelvis may be narrowed in either the sound or the diseased side; the first presents the characteristic deformity. In one-sided coxalgia the weight of the body is chiefly carried on the sound side, which causes an oblique shifting of the pelvis. The immediate cause of the deformity is the early ceasing of the disease, with inequality of the wings of the sacrum—going about with crutches and stocks. As regards its effect on labor he gives the following statistics: In 45 deliveries in twenty-four women with coxalgic pelvis, he had 31 *spontaneous* births, 2 being at seven months; 14 cases *artificial delivery*, of which 3 were basiotripsy, 3 artificial premature delivery, 8 delivery by forceps. One woman died. Of the children, 45 in number, 2 were macerated at delivery; three times was the head pierced. In most of the cases of artificial delivery there was osseous union between the coccyx and sacrum.

THE POSITION OF THE BLADDER AND CERVIX DURING PREGNANCY.

FEHLING (*Centralblatt für Gynäkologie*, 1893, No. 23) in an article on the "Cervix and Bladder in Pregnancy," shows that the capacity of the bladder varies somewhat with the time of pregnancy. In the non-pregnant its position is entirely in the small pelvis, even when full; this also is its position during the first month. With gradual filling the upper border rises perpendicularly to 16 cm. above the upper symphysis border.

As long as any portion of the bladder remains in the pelvis the vaginal portion is strongly moved about, mostly posteriorly and upward or to the left, owing to the firm connection between the base of this organ and the anterior cervical wall. As pregnancy advances and the head of the foetus enters the pelvic brim, the bladder is pushed still farther upward so that none of it remains in the pelvis; it then becomes an abdominal organ. The filling of the bladder and its upward rising may somewhat change the position of the foetal head, and cause for a time a lengthening of the cervix.

As a practical result of his investigation, the author demonstrates the importance of emptying the bladder in order to cause the head of the child to come lower in the pelvis.

And it is possible, by filling the bladder with from 300 to 400 c.cm. of water to change the foetal presentation from a head to an oblique one. He also mentions the rising of the bladder from the pelvis as pregnancy advances as a diagnostic point in determining the period of gestation.

SYMPHYSIOTOMY.

LÉOPOLD VON DITTEL, JR. (*Centralblatt für Gynäkol.*, 1893, No. 23), cites a number of cases in which symphysiotomy was performed with fatal or un-

favorable results. In the first case, a woman with a rachitic flat pelvis, the operation was performed and the child delivered by axis traction, the symphysis separating 7 cm. Episiotomy was also done to aid delivery. In the delivery the clitoris and urethra were both torn; there was considerable hemorrhage. The child died the next day from cerebral hemorrhage and skull fracture. The case terminated fatally for the mother; the cause of death being purulent endometritis of post-partum type, combined with septicæmia and anæmia from the hemorrhage. The urethra, vagina, and cervix were found badly torn after death. Case 2: A secundipara with evidence of rachitis. Pelvic measurements: Spines, 28 cm.; crests, 29½ cm.; troch., 31 cm.; d. brim, 17 cm.; conj. diag., 11 cm.; conj. vera, 9½ cm. Double promontory. Symphysiotomy was performed, and a deeply asphyxiated child delivered, the pubic articulation separating 6 cm. In this case the urethra was completely torn from the clitoris. The patient remained in bed more than six weeks. Pelvic joint healed badly, and incontinence of urine continued for some time.

In addition to the above he gives the outlines of four other cases, all with various degrees of pelvic contraction, and in all the terminations were unfavorable to mother or child, or both.

He concludes by giving his opinion as adverse to symphysiotomy as an operation for the practical surgeon.

KASCHKAROFF (*Centralblatt für Gynäk.*, 1893, No. 19) contributes the reports of two cases of symphysiotomy, with notes on the same, to the literature of the subject. The first was an unmarried primipara of rachitic history, with pelvic diameters as follows: Spines, 27 cm.; crests, 28 cm.; troch., 30 cm.; conj. v., 8 cm., with a considerable scoliosis. The symphysis after the operation separated 2 cm. The pelvic joint was only partially incised, and with the aid of forceps the child was easily extracted. Perfect recovery followed; the pubic joint afterwards found to be completely immovable. The child presented in the first vertex position. The result in the second case was not so fortunate. The patient, in her second pregnancy, was suffering from eclampsia when operated on. Ascites, with œdema of arms and legs, was present. The pelvis showed flattening, the conjugata vera being but 9 cm. The child presented in first position. Symphysis after operation showed a widening of 3.5 cm., further expansion being prevented by side pressure. The patient was delivered under chloroform on account of the eclampsia. The child was extracted by forceps, and died soon after birth. The patient died from eclampsia two days after. On section, the wound was found in good condition; parenchymatous inflammation of the kidneys was present. An examination of the sacro-iliac joints and their ligaments showed them to be sound; but on separating them 5 cm. the articulations were broken. The symphysis measured 4 cm. in length; the upper border 2.3 cm., and the lower 1.5 cm. in thickness.

A CASE OF CONCEPTION IN THE PUERPERAL PERIOD.

KRONIG (Gesellschaft für Geburtshülfe zu Leipzig; *Centralblatt für Gynäk.*, 1893, No. 19) reports a case of conception in the puerperal period.

A woman, twenty-two years old, was delivered on July 4, 1892, of a

healthy child. Four days after delivery coitus took place, but was followed by sexual abstinence lasting three months. Menstruation did not again appear, and in the following November foetal movements were felt by the patient. On March 10, 1893, a healthy child was born, the pregnancy lasting but 243 days, 27 days less than the average. After a careful study of this case the writer comes to the following conclusions:

1. That a perfect child can be born at the end of a less than normal pregnancy (243 days).
2. That spermatozooids can live in the lochial secretion.
3. That ovarian activity is not entirely suspended during pregnancy.
4. Menstruation and ovulation are not dependent on each other.
5. In healthy and strong individuals a very rapid regeneration of the uterine mucous membrane takes place after delivery, and the development of an impregnated ovum in it is very soon possible.

UTERINE ROTATION IN PREGNANCY AND PARTURITION.

FERGUSON (*Edinburgh Med. Journ.*, 1893, p. 1113) remarks that it is to be particularly noted that in examining post partum uteri in ordinary post-mortem examinations, they will be found to have fallen backward owing to the relaxation of the muscles and emptying of the vessels in conjunction with the dorsal decubitus of the body.

There is usually from various causes an inclination of the fundus toward the right side. If the bladder is distended, however, it may be thrown toward the left. According to some authorities the fundus uteri generally falls over to the side to which it has drawn itself back over the child's breech. It is doubtful if after delivery any rotation of the uterus on its central axis takes place, except when caused by a distended bladder, in which case a twist toward the right has been noted.

During pregnancy, however, the uterus is rotated to the right in 80 to 90 per cent. of cases and bears an important connection with the position of the presenting part. Regarding the position of the ovaries in pregnancy the writer says that, post partum, their distance below the fundus uteri is not nearly so great as in the full-term gravid uterus; after labor they bear much the same relation to the uterus, so far as distance below the fundus goes, as in the non-pregnant state.

There can be no doubt that the ovaries increase in size and softness during pregnancy, the one containing the corpus luteum being the larger; they also increase in sensitiveness in the gravid state. Chaignot, in less than three months made thirty consecutive clinical investigations on hospital cases, and found that abdominal palpation employed at the end of pregnancy may produce, on the sides of the uterus in a certain number of women, a sudden and sometimes sharp pain which he considers to be caused by pressure on the ovary. This pain is most frequently found to the left, owing to the torsion of the uterus bringing forward its left lateral edge. The usual position of the ovary, according to Chaignot, is near a line drawn from the anterior superior spine to the umbilicus, usually a few centimetres above it, in the last months of gestation. The average distances are as follows: Left side, 8 to 10 cm. from anterior superior spines; 17 to 19 cm. from umbilicus; 5 to 6 cm. behind

prominence formed by the round ligament. Right side, 7 to 9 cm. from anterior superior spines; 18 to 20 cm. from umbilicus; 5 to 6 cm. from round ligament. The writer appends an abstract of Chaignot's cases as follows: 23 cases ovary on left side; 17 were O.L.A. throughout, 3 were O.L.A. with left ovarian pain to begin with. One changed to O.D.P. and the left ovarian pain changed to right ovarian pain. One changed to O.L.P., and the pain on pressure disappeared, and the ovary likewise ceased to be felt. One changed to O.D.P., and the ovarian pain, though still in the same place, was not so sharp. Three were O.D.P. throughout. Three cases ovary felt on right side three were O.D.P. throughout. Four cases ovary felt on both sides; two were O.L.A., two were O.D.P.

ALLANTOIDO-ANGIOPAGOUS TWINS.

BALLANTYNE (*Edinburgh Med. Journ.*, 1893, p. 1095), in the second of his studies in "Fœtal Pathology on Allantoido-angiopagous Twins," after discussing the definition of the above-named class of monsters, concludes:

1. That the fœtus paracephalus dipus cardiacus is always the product of a plural pregnancy; usually there is one other fœtus *in utero*, but sometimes there are two.

2. The co-twin is generally normal in appearance, but it is often born dead or dies soon after birth. It was always of the same sex as the paracephalic fœtus, except in one case. It is nearly always the first to be born.

3. The mother is almost invariably a multipara, is usually somewhat advanced in years, and has often had a bad obstetric history. In no case is there a record of a previous twin confinement.

4. The pregnancy which results in the birth of a paracephalic fœtus nearly always terminates prematurely, and is occasionally complicated by hydramnios. The fœtus is unable to live separate from the mother.

The paracephalic fœtus has external appearances which are markedly monstrous; it is generally small in size, but is larger than its co-twin, and it nearly always shows an œdematous state of the subcutaneous tissue. The head is usually greatly deformed, the brain hydrocephalic, and the face very imperfect. The upper limbs are nearly always defective; the lower limbs are always present, and are usually normal, except as regards the number of the toes. The thoracic walls are sometimes defective; the heart is always present, but nearly always greatly malformed, and is sometimes not in direct communication with the umbilical vessels; the lungs are often absent and the diaphragm wanting. The liver, spleen, stomach, and pancreas are usually absent; the intestine is defective, and generally ends blindly; the kidneys, ureters, and bladder are in most cases present, but are sometimes defective, and the genital organs are occasionally imperfect or rudimentary. The placenta is probably always single; the amniotic sacs are usually separate; and the vessels of the umbilical cord of the deformed twin are usually defective and communicate with those of the cord of the normal twin. It would seem that the paracephalic fœtus with a heart must have two circulations—one carried on by its own heart and the vessels connected with it, the other by means of the vessels passing to it from the normal twin; both these circulations are no doubt imperfect, and this imperfection is doubtless the cause of the œdema which is so common.

THE RELATION OF PELVIC PERITONITIS TO ECTOPIC PREGNANCY.

MARTIN (*Berliner klinische Wochenschrift*, 1893, No. 22), after giving the opinions of various authors on the relation of pelvic peritonitis to ectopic pregnancy, records that, in his own opinion, in the majority of cases the peritonitis acts more as a rapid consequence of the ectopic insertion of the ovum than as a cause of this abnormality. The growing ovum works unmistakably as a centre of inflammation, causing not unimportant changes in the immediate and distant neighborhood, such as adhesions and other changes found after pelvic peritonitis from other causes. Also against the theory of tubal disease offering a cause for ectopic gestation, he argues that the impregnated ovum requires a healthy situation in which to grow, and thinks it very uncertain that it is possible for it to develop on the diseased mucous membrane of the uterus, much less in an unhealthy tube. The mucous membrane may have previously been diseased, but must be healthy at the time of the impregnation and attachment of the ovum.

The author then describes a case on which laparotomy was performed for right tubal pregnancy. The tumor was the size of a pigeon's egg. The omentum and the peritoneum, parietal and visceral, were engorged with blood. The ovum, which was perhaps four weeks advanced in gestation, was situated between the fimbriated extremity and the ovary. The ovary was considerably enlarged and was partially covered by a rough covering. Its surface was considerably congested and had remaining a single follicular elevation.

FIRST SYMPHYSIOTOMY ON THE PACIFIC COAST.

HOLMES (*New York Journal of Gynecology and Obstetrics*, 1893, No. 5) reports a case of a primipara with a conjugata vera of three inches, upon whom symphysiotomy was performed. The cartilage between the bones was cut with a scalpel (Galbiati's knife not being at hand) from before backward, from above downward, with little trouble. Child was extracted by means of forceps. During birth of child the pubic bones separated more than one and a half inches. Patient made a good recovery.

EXTRA-UTERINE PREGNANCY, WITH RUPTURE OF THE TUBE.

BURRAGE (*New York Journal of Gynecology and Obstetrics*, 1893, No. 5) reports a case of a woman ten months married, who, with a history of previous good health, was seized with a most severe and sudden pain in the lower abdomen while making a bed. Patient had had no menstruation during September or October.

On incising the peritoneum, which was thickened and opaque, there was a gush of gas having the foulest sort of odor. Dark fluid blood and disorganized clots and shreds of green, gangrenous tissue welled up out of the wound. It appeared as if he had opened into the sac of a hæmatocele, which contained a quart of fluid and débris. The sac and cavity were washed with hot salt solution. Both ovaries and tubes adherent to the sac-walls were so rotten that it was impossible to form a pedicle. Right tube was three times the normal size. After some symptoms of septic absorption, patient made a good

recovery, although a sinus existed to the bottom of Douglas's cul-de-sac for one month after operation.

HYPERTROPHIC ELONGATION OF THE CERVIX AS A CAUSE OF OBSTRUCTED LABOR.

GRIFFITH (*British Med. Journ.*, 1893, No. 1688) cites two cases (his only experience in forty years) of obstructed labor caused by an elongated and enlarged cervix and os uteri. In the first, a woman, the mother of two children, the os was in the vulva, was excessively swollen and livid, with a posterior and anterior slit at least an inch deep in the cervix, which was much elongated. After a labor of eight days, during which the patient was in great suffering, the pains ceased altogether, and it was found that the uterus had ruptured transversely and exactly on a level with the peritoneal surface of the roof of the vagina. Porro's operation was recommended, but was refused by the family of the patient. She died fifteen hours afterward.

In the second case, which was very similar to the first, the long forceps was applied, but it was not until three attempts had been made that delivery was finally accomplished. Metritis set in, and in five or six days the patient succumbed.

GYNECOLOGY.

UNDER THE CHARGE OF

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METROSTAXIS AND MENSTRUATION AFTER OPERATIONS ON THE BROAD LIGAMENT.

SINCLAIR (*British Med. Journal*, May 27, 1893) draws the following inferences from his clinical observations on this subject: Metrostaxis following removal of the ovaries and tubes, where it occurs immediately after operation or later, is due to the fact that the main arteries have not been tied together with the venous plexuses. It thus results that while the blood-supply to the uterus is still free, the return flow is interrupted, the organ remains congested, and involution is retarded, even after the adnexa have been thoroughly removed, menstruation continuing for months, or even years. On the other hand, if the arteries have been ligated, even though the tubes and portions of the ovaries have been left, the uterus undergoes involution, and menstruation eventually ceases. It follows that the Fallopian tubes have no causative influence upon the monthly flow.

The practical deduction from these facts is that in ligating the pedicles the operation should include the main branches of the ovarian arteries, especially in cases of uterine fibroid, in which the main purpose is to induce premature menopause.

[This explanation of the familiar phenomenon observed after removal of

the adnexa is a plausible one, but evidently does not apply to every case of metrostaxis or pseudo-menstruation, since it is well known that the persistent congestion, and resulting endometritis fungosa, which is observed after oöphorectomy, is referable not infrequently to the presence of retroflexion, pelvic indurations and adhesions, broad-ligament cysts, etc. Our practical experience of the free vascular anastomosis in the broad ligaments, gained in abdominal hysterectomy, has proved how little the blood-supply of the corpus uteri is affected by ligating the ovarian vessels alone.—H. C. C.]

CLINICAL STUDY OF CERVICAL DYSMENORRŒA.

HANFIELD-JONES (*ibid.*) criticises the attempt of authors to refer all cases of uterine dysmenorrhœa to a single cause, and cites a number of cases from his own practice to show how many different factors may be active. Among these are the neuralgic, inflammatory, and spasmodic types. The writer believes that rhythmical uterine contractions occur at the beginning of menstruation, which, with simultaneous inhibition of the sphincter fibres, causes dilatation of the cervical canal. Under normal conditions these phenomena are unaccompanied by pain. Any pathological condition which delays the process of dilatation is attended with painful menstruation, such as displacement of the uterus, muscular spasm at the os internum, fibroid thickening at the same point, and hyperæsthesia of the nerve-endings resulting from endometritis. Practically, when cervical endometritis is present, hot douches, leeching, and applications of carbolic acid or iodized phenol are indicated, but when no such disease can be found dilatation offers the most certain means of relief.

TREATMENT OF PELVIC SUPPURATION.

TERRIER and HARTMANN, in a paper read before the recent French Surgical Congress (*Le Mercredi Médical*, 1893, No. 15), report fifty-nine cases of abdominal section, with a mortality of nearly 12 per cent. Drainage was employed in forty-three cases, without irrigation. In two-thirds of the patients the ultimate results were entirely satisfactory. The writers consider that their experience justifies them in preferring cœliotomy to vaginal hysterectomy in the treatment of suppuration of the adnexa, since the risks are less, and it is possible in some cases to preserve one tube and ovary. In the discussion which followed, Michaux defended hysterectomy, quoting the relative results in three hundred and seventy-five hysterectomies and an equal number of cœliotomies—the mortality in the former being $8\frac{1}{2}$, in the latter 15 per cent.

SUPPURATION IN OVARIAN CYSTS FOLLOWING TYPHOID FEVER.

WERTH (*Deutsche med. Wochenschrift*, 1893, No. 21) reports the case of a patient upon whom he performed ovariectomy several months after recovery from typhoid, removing a cyst with purulent contents, bacteriological examination of which revealed the presence of typhoid bacilli. This case is unique, not only on account of the site of the infection, but the prolonged survival of the specific bacilli of typhoid in a purulent focus. The case seems to favor the theory of possible multiple infection, since these micro-

organisms have been found in the bones, lungs, testicles, and peritoneum, where they have caused suppuration. In every case of suppurating ovarian cyst search should be made for a previous history of typhoid.

CASTRATION IN OSTEOMALACIA.

STERNBERG (*Wiener klin. Wochenschrift*, 1892, Nos. 44 and 45), from a study of eleven cases, draws the following conclusions: 1. If the patient's pelvis is so deformed that the birth of a living child, or the successful induction of abortion is impossible, castration should be performed; 2. If the patient is so near the menopause that conception is improbable, or is in such a poor condition that cœliotomy would be inadvisable, or the patient refuses operation, the phosphorus treatment may be used; 3. In all other cases, whether in young or old patients, the treatment with phosphorus is the best.

KUMMER (*Revue Méd. de la Suisse Rom.*, 1892, No. 7) reports a successful case of oöphorectomy for osteomalacia (the first reported in Geneva) and refers to thirty-eight other cases that he had collected, in all of which the patient was cured by the operation.

THE ORGANIZATION OF HÆMATOCELE.

SÄNGER (*Centralblatt für Gynäkologie*, 1893, No. 25) believes that the vast majority of cases of hæmatocele are from escape of blood from the Fallopian tube—usually tubal abortion. The position of the tube accordingly determines the site of the hæmatocele; the blood is more often found laterally than at the bottom of Douglas's pouch. Hæmatocele may be diffuse or isolated; in the first variety the blood-clot is found spread throughout the meshes of adhesions, while in the latter it forms a single tumor, which is only moderately adherent to the surrounding parts. The former is encapsulated by pseudo-membranes and is quickly absorbed, while the isolated tumor has a thick, hard capsule of old coagulum with softened interior, and can be readily enucleated like an adherent cyst. Surgeons have confounded these two varieties and have supposed that they were removing a sac, when they were simply enucleating an isolated hæmatocele. A careful examination is often necessary to distinguish such a mass from a tubo-abdominal mole, pregnancy in the distal end of the tube, or an ovarian hæmatoma. When the blood is poured out slowly, coagulates from without inward, and an inflammatory process takes place in the surrounding tissues, a capsule of fibrin is formed, which is thickened by deposits of fibrin upon its inner surface. This remains stationary for three or four weeks, when it begins to be penetrated by new-formed vessels from neighboring organs. The capillaries penetrate to the interior of the mass and gradually liquefy and absorb it. The cavity in the centre collapses, its walls adhere, and the flattened mass is eventually transformed into a cicatricial nodule, months, or perhaps years, elapsing before the retrograde process is complete.

As regards the prognosis of a circumscribed hæmatocele, so long as the capsule is thin and fresh there is danger of secondary rupture, but if it has not increased in size at the end of two or three weeks, but preserves its rounded shape, it is safe to infer that its capsule is so firm that the tumor can be safely enucleated.

The writer advises cœliotomy for the removal of hæmatoma due to tubal abortion or rupture of an ectopic sac, in preference to vaginal incision, and reports eleven successful operations. Radical removal is preferable to simple ligation of the vessels, or tampon-drainage as recommended by Miculicz.

BIMANUAL EXAMINATION OF THE POSTERIOR AND LATERAL WALLS OF THE PELVIS.

FREUND (*Centralblatt für Gynäkologie*, 1893, No. 25) affirms that the ligaments and muscles of the pelvis can be most readily palpated bimanually if the patient is examined in the erect posture, one hand exploring the vagina, while the other is passed over the buttocks.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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WATER FILTRATION AND CHOLERA.

DR. ROBERT KOCH, in an article on "Water Filtration and Cholera" (*Zeitschrift für Hygiene und Infektionskrankheiten*, July 7, 1893), gives a number of interesting facts in support of the drinking-water theory of transmission of cholera and typhoid fever—facts which the Pettenkofer school will find it difficult to explain. The recent experiences of Hamburg, Altona, and Wandsbeck have been instructive in the highest degree. These three cities, which are adjacent one to another, form practically one city, having all conditions in common with the exception of the water-supply. Wandsbeck is supplied with filtered water from a lake not exposed to pollution; Hamburg drew its water in an unfiltered condition from the Elbe at a point above the city, while Altona is supplied with filtered water taken from the river below the city. While Hamburg was frightfully stricken by cholera, Altona and Wandsbeck were almost free from it. Particularly interesting and impressive is the fact that the Hamburg supply was taken at a point where the contamination of the river was relatively slight, while the Altona supply, which was filtered before distribution, was taken at a point below the entrance of the sewage of nearly 800,000 people. Still more interesting is the experience of those living at the boundary line between the two cities. On one street, which for a long distance is the boundary, the Hamburg side was stricken, while the Altona side remained free. One group of houses on the Hamburg side was quite free from cholera, and it happens that they were supplied with water from Altona. Koch naturally attributes the comparative im-

munity of the city of Altona to the filtration. Out of about 500 cases, at least 400 could be set down as having originated in Hamburg or through some particular conditions. But the experience of the present year has taught that a filter bed of itself is not protection enough. The bed must be complete in every detail, and filtration must be most carefully conducted and with constant bacteriological control experiments. Investigation of outbreaks of typhoid fever at Altona had demonstrated a connection between the disease and imperfect filtration, and it had been noted that outbreaks occurred after every period of prolonged cold. In January and February of the present year cholera cases occurred all over the city. These could not be traced to Hamburg, as many of those seized had not been in Hamburg, others had not been out of their dwellings, and moreover there was no cholera in Hamburg at the time. A few cases which did occur in Hamburg were in one small district supplied with Altona water. From October 1, 1892, bacteriological examinations of the filtered water in the reservoir had been made almost daily. In the first week in December a rapid increase in the number of bacteria was observed; from December 30th the number began again to increase, and on January 12th reached 1516 per cubic centimetre, then fell for a time, but rose again during the last week of January to from 1200 to 1400. As it was evident that filtration was proceeding imperfectly, the different filter beds were examined, and it was found that they varied widely in efficiency; that cleansing of the filters was followed by a period of several days of inefficiency, and that renewal of the sand acted to still further diminish the efficiency for a still longer period. One of the beds (No. 8), which acted more imperfectly than the others, was found to be frozen at the surface, and this had for a time wholly prevented filtration, which after a time went on at places which became thawed. The object of sand filtration is to free the water from suspended matter; soluble matters pass through the filter wholly or nearly unchanged. The process is not maintained by the sand alone, for a layer of mud must form on the surface of the sand, and this layer is the true filtering medium. It must be uniform, and during filtration must not be disturbed. When it becomes so thick as to be permeable with difficulty, it must be removed. Different waters require varying lengths of time for the formation of this layer according to the amount of mineral and vegetable impurities present; thus, some waters rich in clayey matter deposit a good layer in eight to ten hours, while others containing chiefly vegetable impurities require at least twenty-four. At certain times in the year, particularly when the vegetable matter is largely increased in amount by the enormous development of algæ, the layer may in a few days become quite impermeable. It has been observed that for complete filtration the depth of the sand in a bed must not be less than 30 centimetres, and the rate of flow should not exceed 100 millimetres per hour. When anything occurs to interfere with perfect filtration, a change is at once observable in the character of the effluent. When acting properly, less than one hundred bacteria are found in a cubic centimetre of the effluent, regardless of the number present in the original water, whether they were to be counted by the hundred or by the hundred thousand. But the slightest disturbance of the proper conditions, as, for instance, acceleration of the rate or damage to the surface, causes an immediate increase in the number of

microbes. In well-filtered water the greater number of the microbes are derived from growths on the materials composing the lower part of the bed, and these organisms are harmless. A small number of microbes come undoubtedly from the original unfiltered water, for it is impossible to keep back absolutely every one.

FLIES AND THE SPREAD OF CHOLERA.

DR. J. SAWTSCHENKO (*Centralblatt für Bakteriologie und Parasitenkunde*, Band xii. p. 893) reports the results of a series of experiments conducted for the purpose of ascertaining the possible connection between flies and the spread of cholera. Ordinary house-flies and another kind were fed with pure cultures of cholera, and as late as four days after ingestion the bacilli could be detected in the bowel contents and in the excreta. Bacilli taken from the contents of the bowels three days after ingestion and introduced into guinea-pigs caused death about as quickly as would the pure cultures themselves. The results were the same when the flies were fed with the excreta of cholera patients instead of the pure cultures. Some of the results of feeding indicated that the bacilli probably multiply within the fly, so that the insect is not only a distributor, but a breeding-place for the bacillus.

U. SIMMONDS also (*Deutsche medizinische Wochenschrift*, 1892, No. 41) made experiments in this same line. He caught a fly in the autopsy-room at Hamburg when it was crowded with bodies of those who had died of cholera, and made a bacteriological examination, which demonstrated numerous cholera bacilli. In order to ascertain how long the cholera poison could remain active on flying insects, experiments were made, which showed that it remained virulent up to an hour and a half after drying, which is time enough for considerable distribution over long distances. The desirability of carefully covering all objects contaminated by cholera dejections and of covering all food against flies is plain. After the first experiment with the flies in the autopsy-room, the bodies were sewed up as quickly as possible and the tables well washed, and subsequent experiments were negative in results.

CHOLERA AND IMPURE WATER.

DR. F. REGNAULT (*Médecine Moderne*, February 22, 1893) claims that the polluted water-supply of Marseilles must have been responsible in some degree for the last previous epidemic of cholera in that city. The water is derived from the river Durance by a conduit, which within four miles of the city receives a very large amount of pollution. The water passes through a densely populated district, serves as motive power for a number of mills and factories, including grain mills, in which, in addition, it is used for washing the grain which comes from Russia, India, and the Levant, where, instead of machinery being used for the purpose, it is trodden by human feet. Bacteriological examination of samples taken at different points showed an enormous increase in the number of bacteria per cubic centimetre. A part of the city is supplied with water from the river Huveaune, which receives the sewage of a number of villages, and is extremely rich in bacteria.

CHOLERA AND WATER-SUPPLY.

DR. RAI BAHADUR A. MITRA, chief medical officer, Kashmir (*The Indian Medical Record*, February 15, 1893), advocating the appointment of a cholera commission for the systematic investigation of the cholera question, directs attention to the importance of not considering the water-supply question to the exclusion of all others, and, in fact, goes further, and says that it should not be the first item in the budget of sanitation. He cites several instances mentioned by Surgeon-Colonel Hamilton of cholera breaking out under circumstances in which the water-supply could not be suspected. Cholera sometimes attacks the English barracks, while the filthy native bazaars close by with a filthy water-supply escape. The fall of cholera mortality in Calcutta came after the introduction of a supply of pure water, but with this new supply came at the same time drainage, improved sewerage, efficient conservancy, and improvement of filthy *bustees*. Mitra claims that if it depended on water alone, Calcutta ought to be free from cholera, whereas it is seldom absent at any time. Admitting that pure water is of great importance, he asserts with emphasis that decaying vegetable and animal matter, bad drainage, and overcrowding are as much responsible for cholera as bad drinking-water, and that the removal of fecal matter and efficient surface and subsoil drainage will reduce the chance of introducing cholera into a town to a minimum. In supplying pure water to the natives, it must be brought to the very door or they will not use it. Without drainage the subsoil water rises, the surface moisture increases, and the exact conditions favorable to cholera and typhoid increase. Dr. Mitra expresses the opinion that to improve the sanitary condition of a place, the removal and disposal of filth, the prevention of overcrowding, and drainage and roads are by no means of secondary importance; but that when the cholera seeds have germinated in filth, water stands pre-eminently the most convenient, ready, and easy distributing agent.

EXPERIMENTAL EATING OF CHOLERA BACILLI.

DR. HASTERLIK (*Correspondenzblatt für Schweizer Aerzte*, April 1, 1893) has repeated on himself and three others Pettenkofer's experiment with cholera bacilli without injury. At first the experimenters took only small amounts of cholera cultures without result, then they took larger amounts, and one of them ate an entire culture of a third generation. In this case in thirty-six hours came pain in the bowels, tenesmus, and diarrhœa of no particular characteristics. In one other experiment, in which not a sign of sickness occurred, the cholera bacillus was found in the normal dejections.

DETECTION OF SMALL AMOUNTS OF CHOLERA GERMS IN LARGE AMOUNTS OF WATER.

DR. ARENS (*Münchener med. Wochenschrift*, March 7, 1893) has been experimenting with a view to finding a means which would provide the most favorable conditions for the growth of the cholera germs, and at the same time kill or at least hinder the growth of other bacteria. After a number of experiments he found such an agent in caustic potash. Experiments with

175 c.c. of water, 25 c.c. of pancreas bouillon, and varying amounts of 10 per cent. solution of caustic potash, showed that with increase in alkalinity to a point representing 0.30 per cent. of caustic potash, there was a diminution in the number of bacteria to sterility; but that with 0.05 to 0.08 per cent. the growth of the cholera germ was favored. By alkalizing to this extent specimens of water containing known amounts of cholera germs and pancreas bouillon, the cultures could be made and isolated when 5 c.c. of the water contained but two organisms, and under some conditions when containing only one.

INFLUENCE OF STRONGLY SALINE WATER ON THE DEVELOPMENT OF CHOLERA BACILLI.

DR. AUFRECHT, of Magdeburg (*Centralblatt für Bakteriologie und Parasitenkunde*, March 23, 1893), reports that strongly saline water may favor the development of cholera bacilli. The river Elbe receives enormous amounts of salts from various chemical works, and on January 9th contained in 100,000 parts of water, 19.5 of lime, 8 of magnesia, and 179 of chlorine; at this time the water was unfit for use. To decide the question whether such water would favor the development of the cholera bacillus, Aufrecht inoculated cholera bacilli on—

1. Slightly alkaline nutrient gelatin.
2. Gelatin with 1 per cent. of soda.
3. Gelatin with one gramme of Elbe water concentrated to one-tenth.

The development of the organisms on No. 3 was as good as that on No. 2; in both cases being better than on No. 1.

PRECAUTIONS AGAINST CHOLERA.

THE CONFERENCE OF PORT MEDICAL OFFICERS OF HEALTH (*Sanitary Record*, January 1, 1893) resolved "that it is desirable, as a general principle, that medical inspection for the prevention of cholera should be kept up by day and by night without any intermission," decided to request the London Port Sanitary Authority to issue, as occasion arose, a list of infected ports for the guidance of all the port medical officers, and to approach the Local Government Board to ask for compulsory powers of detention of ships from suspected or infected ports, and that these ships should not be released till they had received a certificate from the port medical officer. It was agreed that all ships from infected or suspected ports should be treated as infected until found to be otherwise.

Quarantine was defined as the detention of a healthy ship, and it was resolved unanimously, "that in the opinion of this conference, quarantine or the detention of a vessel having no sickness on board, and so certified by the medical officer of health, is unjustifiable." Though disapproving of quarantine, the practice of taking the names and addresses of passengers and crews was approved.

Resolutions were passed requiring lodging-house keepers to keep a register containing the particulars regarding sailors and others coming from infected or suspected ports, and that sanitary authorities ought to provide forthwith proper and special hospital accommodation for the treatment and isolation of

cholera cases. Objection was made to floating hospitals, as these could be placed only on smooth water of a river which might easily become contaminated by the patients.

REPORT OF THE "LANCET" SPECIAL COMMISSION ON THE WATER-SUPPLY
OF CHICAGO.

THE report of the *Lancet* special commission on the Chicago water-supply is, in general, very favorable. In spite of the dumping process—that is, the discharge of sludge dredged up from the beds of the river—into Lake Michigan, chemical analysis fails to furnish any distinct evidence that the lake is seriously polluted. Water taken from the lake over the dumping grounds was of a quality, save for its suspended matter, superior to that of the ordinary London water-supply—that is to say, the percentage of dissolved matter of organic origin was less than in the London waters, and as the suspended matter could all be removed by effective filtration, it is plain that even at this point the lake, under favorable conditions, will supply water which wants nothing but the most ordinary treatment to render it fit for any and every domestic purpose. Unfiltered this water is quite unfit for drinking by reason of its suspended matter; hence the security of Chicago against a serious outbreak of epidemic disease depends entirely on the care with which the water is purified before use by domestic filters. The filtered water examined by the *Lancet's* chemists had in both cases been cooled by the admixture of polluted ice, which manifestly renders the filtration futile. The results of chemical analysis lead to the conclusion that the clear or filtered lake water is comparatively pure. It is of excellent quality and well adapted for both dietetic and other ordinary purposes. In respect of organic purity, the water of Lake Michigan contrasts very favorably with the water supplied to London.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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IMMUNITY: EVIDENCE OF THE CORRECTNESS OF THE "ANTITOXIN
THEORY" DEDUCIBLE FROM THE SPECIFIC TREATMENT OF TETANUS.

WE have seen that the most perfect degree of immunity and the most suggestive line of proof of the agency of antitoxins in its establishment has been developed in the study of tetanus; it is also the disease in which the facts of immunity experimentally educed were first put to therapeutic test.

It is neither strange, nor does it greatly militate against the correctness of the theory under discussion, that at first these therapeutic tests should have

been unsuccessful. Caution was necessary in the employment of a substance so powerful as the antitoxin of tetanus, and the effect of the injection of large quantities of the blood serum of immunized animals had not then been determined.

It will be remembered that the first experimentally induced immunity to tetanus was obtained by Behring and Kitasato. They established the immunizing action of the blood serum of their immune animals when introduced into susceptible animals, and it was suggested that a curative effect might similarly be obtained in cases of human tetanus. The opportunity to test this soon presented itself, and the result of the experiment was reported to the Berlin Medical Society, February 4, 1891, by A. BAGINSKY (*Berliner klinische Wochenschrift*, 1891, No. 7, 176). A well-developed child, nine days old, suffered from a very pronounced case of trismus and tetanus neonatorum as the result of infection through the navel. Having never seen any benefit to result from the ordinary medicinal treatment in such cases, Baginsky invited Kitasato to see the case and to direct treatment with the blood serum of immune animals. The diagnosis was confirmed by the detection of tetanus bacilli in the pus of the inflamed navel, and their virulence was shown by animal inoculations. The child received in three days six injections of the blood serum of an immune rabbit, aggregating 1.5 c.c., but without appreciable effect upon the course of the disease. It was, however, shown that such injections were quite devoid of danger, and it was suggested that larger doses might prove more efficacious in a subsequent case.

Soon after Baginsky's experiment in Berlin a notable series of tests of the therapeutic value of the antitoxin of Tizzoni and Cattani began in Northern Italy, the majority of them under the eye of Prof. Tizzoni himself. The first of these, reported by GAGLIARDI, but not until nearly a year after its occurrence (*La Riforma Medica*, 1892, No. 76; *Centralblatt für Bakteriologie und Parasitenkunde*, 1892, xii. 115), was made in the case of a robust laborer, forty-five years of age, who cut his left foot while working in the field. Twelve days after the injury symptoms of tetanus made their appearance, and a well-marked and unmistakable type of the disease was quickly developed. Four injections in five days, of twenty-five centigrammes each, of the antitoxin of Tizzoni brought about complete subsidence of all the symptoms.

The second case, published in fact before that of Gagliardi, is recorded by SCHWARZ (*Centralblatt für Bakteriologie und Parasitenkunde*, 1891, x. No. 24, 785). The patient, a previously healthy boy, fifteen years of age, cut his left arm in the region of the elbow with a dirty knife, which he was using to cut a nut which he had picked up from the ground. The wound healed without other complication at first than secondary hemorrhage. But two weeks after the accident he was taken to the hospital in Padua suffering from occasional spasms, at first confined to the left arm, but later becoming general, and associated with trismus, which in a few days made it impossible for him to move his jaw. There could be no doubt as to the nature of his trouble, especially as examination of the earth with which the knife had been soiled showed the presence of the tetanus bacillus both by culture and by animal inoculation.

Treatment with chloral, warm baths, and injections of carbolic acid,

according to Bacelli's method, having proved ineffectual, a preparation of the tetanus antitoxin was obtained from Prof. Tizzoni. The first injection of fifteen centigrammes was followed by temporary fall of temperature, sweating, and some amelioration of the spastic condition. More lasting benefit followed a second injection of a like amount on the following morning, and in the afternoon of the following day the dose was increased to twenty-five centigrammes, with noticeable improvement on the following morning (fourth of the treatment) as the result, the spasm of all the muscles being much lessened, so that the patient could walk, though unsteadily. In the afternoon another injection of twenty-five centigrammes was given, and on the following morning the patient was able for the first time to open his mouth and masticate solid food. The spastic condition of the muscles had disappeared and appetite began to return. The improvement in the patient's general condition was now rapid and uninterrupted, the only symptom remaining on the sixth day of the treatment being slight weakness of the muscles.

The third, and in point of severity the most remarkable case of traumatic tetanus cured by antitoxin treatment is reported by PACINI (*La Riforma Medica*, 1892, No. 4; *Centralblatt für Bakteriologie und Parasitenkunde*, 1892, xi. 423). A man, twenty-one years old, wounded his finger in cutting feed in a barn where oxen, rabbits, and a goat were kept. The cut healed. Ten days later inability to move the jaw as freely as usual was noticed. This increased, and was followed by rigidity of many of the muscles, compelling him to apply for relief at the hospital on the nineteenth day after the accident. The diagnosis of tetanus traumaticus was easily made, and the chloral treatment was instituted, but without benefit, the convulsions increasing till their number reached *eighty-five* on the twenty-fifth day after the injury. On that day the patient received two injections of twenty-five centigrammes each of Tizzoni's antitoxin, prepared from the blood of an immune dog. Similar injections were given twice daily until seven doses had been given, when such marked improvement had resulted that they were discontinued, the patient making a good recovery with the aid of occasional doses of chloral. As during the exhibition of the antitoxin no other medication was used, and each dose was followed by distinct amelioration of the symptoms, there seems to be no room for reasonable doubt of the curative effect of the antitoxin.

The fourth of these remarkable cases is reported by FINOTTI (*Wiener klinische Wochenschrift*, 1892, No. 1) from the surgical clinic of Prof. Nicoladoni in Innsbruck. The patient was a boy, eleven years old, whose hand was crushed in a threshing machine. Notwithstanding amputation, in eight days trismus began to develop, and was followed by general muscular rigidity and convulsions. The antitoxin treatment was ordered by telegraph from Prof. Tizzoni, and on the eleventh day after the injury the injections were commenced and were continued daily for two weeks, the doses varying from 15 cgm. to 25 cgm. These were followed, as in the other cases, by fall of temperature, sweating, and amelioration of the tetanic symptoms until recovery was complete.

The fifth case is reported by TIZZONI himself (*La Riforma Med.*, 1892, No. 160; *Centralbl. f. Bakt. u. Parasit.*, 1892, xii. 801). A lacerated wound of the middle finger was soiled with dirt. Twelve days later symptoms of

tetanus began to develop and increased to such an extent that Tizzoni ordered amputation of the finger to prevent further absorption of the poison and at the same time began treatment with the blood serum of an immune rabbit. Sixteen injections of from $2\frac{1}{2}$ to 5 c.c. blood serum, 40 c.c. in all, were given, and six injections, aggregating 1.35 grammes, of antitoxin prepared from the blood of an immune rabbit. The recovery was perfect.

The previous cases had been treated with antitoxin obtained from the blood of immune dogs. Tizzoni argues from his success in this case that the blood serum of the rabbit, and the antitoxin prepared from it, are equally efficacious with those prepared from immune dogs.

TARUFFI (*Centralblatt für Bakteriologie und Parasitenkunde*, 1892, xi., No. 20, 625) reports a sixth case. A peasant, seventy-four years old, inflicted a bad lacerated and contused wound of the little finger of the right hand. The wound was not dressed, and suppurated. On the tenth day symptoms of tetanus developed. These rapidly increased in severity and two days later Prof. Tizzoni visited the case and the first injection (25 cgm.) of the antitoxin was given. This was followed by decided improvement, the patient becoming more quiet, the temperature falling, perspiration being abundant, and an increased elimination of urine being noted. Notwithstanding the marked improvement it was thought best to amputate the wounded finger. Virulent tetanus bacilli were cultivated by Prof. Tizzoni from the wound. The symptoms gradually passed away under the influence of repeated injections of the antitoxin, aggregating 150 cgm. in less than four days, until on the eleventh day after commencing the treatment the patient was well.

Interesting features of this case are the proof of the toxicity of the urine before the antitoxin treatment and the disappearance of this feature on the third day of the treatment, and the failure of the blood serum of the patient to induce symptoms of tetanus in a rat on the second day of the treatment, both of these observations directly pointing to a neutralizing power on the part of the antitoxin as regards the toxins of the disease.

An interesting feature of the seventh case is the evidence offered by it of the curative power of the antitoxin when tetanus and septicæmia are associated. This case, recorded by CASALI (*Centralblatt für Bakteriologie und Parasitenkunde*, 1892, xii., Nos. 2 and 3, p. 56), occurred in a woman, twenty-two years of age, whose foot was injured while at work in the field. She thought little of it, continued her work, barefooted, during the whole day, and walked home two miles in the evening. The next day the foot was so sore as to prevent her walking, and she was seen by Casali, who dressed the wound and ordered complete rest in bed. This order was disobeyed, and suppuration set in in a few days, and a little later swelling of the glands in the groin, fever, and prostration gave signs of septic intoxication. Two weeks after the accident symptoms of tetanus were superadded, and cultures made by Prof. Tizzoni from the pus of the wound demonstrated the presence of the tetanus bacillus in association with the *streptococcus septicus*. The antiseptic treatment of the wound was more energetically carried out and the antitoxin treatment was at once begun. The symptoms gradually improved, those of septic intoxication considerably outlasting the symptoms of tetanus which entirely disappeared after the sixth injection of the antitoxin.

The association of tetanus and septic intoxication in this case seems

unquestionable. In view of this the rapid subsidence of the symptoms of the former disease under the antitoxin treatment while the septic symptoms continued is of the greatest interest, as bearing out the idea of the specific curative effect of the tetanus antitoxin, and also shows that this effect is not seriously impaired by the presence of other toxins than those of the tetanus bacillus. For these reasons this case appears to us to offer the most conclusive proof of the correctness of the antitoxin theory of immunity which has yet been afforded by therapeutic experiment.

The eighth case of cure of traumatic tetanus by means of the antitoxin treatment is reported by FINOTTI (*La Riforma Med.*, 1892, No. 148; *Centralbl. f. Bakt. u. Parasit.*, 1892, xii. 801), who, it will be remembered, had already recorded the fourth. In this case the tetanic symptoms followed a compound fracture of the left forearm. The tetanus antitoxin was the only treatment employed, 480 cgm. of the antitoxin being given in twenty-three injections. Recovery was perfect.

Early in 1892, two cases of traumatic tetanus were treated in the Hôpital Necker in Paris, by Vaillard and Roux, by means of subcutaneous injections of the defibrinated blood of immune rabbits, but without benefit. These cases are reported by REXON (*Annales de l'Institut Pasteur*, 1892, No. 4, 233). The first, a laborer, twenty-nine years old, received in all 57 c.c.; the second, a fifty-seven year old laborer, received 80 c.c. In the latter case the blood had been proved to have a marked antitoxic effect upon mice. Both patients died, though temporary improvement is said in each case to have followed the injections. It seems probable, in view of the experiments of Behring and Tizzoni, that the amount of antitoxin contained in the doses of blood employed was too small to be followed by more than the temporary improvement recorded.

BEHRING, who has been one of the most ardent workers in the field of immunity from the first, has devoted the second part of his recent work upon the "Blood-serum Therapy" (*Die Blutserumtherapie. II. Das Tetanusheilserum und seine Anwendung auf Tetanusranke Menschen.* Leipzig: G. Thieme, 1892) to the discussion of the curative value to man of the serum of animals immune to tetanus. In this he most convincingly champions the cause of the new therapy and states it as his belief that the early exhibition of the treatment (within thirty-six hours after the onset of symptoms) would reduce the mortality of traumatic tetanus from 85 per cent., or thereabouts, to less than 35 per cent. His experiments lead him to the same conclusion reached by Tizzoni regarding the identity of the antitoxin of tetanus in all cases, whether obtained from the blood of dog, rabbit, or horse.

In the same publication, the history of a case of tetanus is reported by ROTTER (also in *Deutsche med. Woch.*, 1893, No. 7, 152), in which five injections of the serum of an immune horse, on five successive days, brought about speedy subsidence of the symptoms. In all, 261 grammes of the serum were injected. As the case was of undoubted nature and of much severity, its favorable outcome is looked upon by Behring as decided evidence of the value of the "blood-serum therapy."

The beneficial effect of similar treatment of sheep and horses suffering from tetanus is further reported by BEHRING and CASPER.

In a recent paper by ROUX and VAILLARD (*Annales de l'Institut Pasteur*,

1893, No. 2, 65) seven cases are reported in which the therapeutic value of the blood serum of immune animals was tested. As recovery occurred in only two of them, it may be well to consider some of their features.

In all of the fatal cases the course of the disease was unusually rapid, the longest of them lasting only six days, the shortest two days. The treatment was not begun until relatively late, in two cases not until the fourth day of the disease, and in none before thirty-six hours had elapsed. Furthermore, the dosage was small considering the severity of the cases; in only one can it be said to have been at all adequate, and, as it happens, this was the case which survived the longest—two and a half days after the beginning of the injections.

The two successful cases were of much longer duration and slower progress, and the treatment was begun in them relatively early in the course of the disease. The dosage, too, was larger than in the fatal cases, and improvement set in almost immediately after the exhibition of the treatment.

Notwithstanding their poor success with the treatment, Roux and Vailard advocate its employment at the earliest possible date after the onset of symptoms, making use of not less than 100 c.c. of blood serum of the highest possible immunizing power at each dose, the dose to be repeated twice daily if necessary. Used in this way they believe that much is to be hoped from the treatment, especially when associated with thorough antiseptic care of the wound, if possible with excision of the surrounding tissue.

We have thus accumulated nineteen cases of traumatic tetanus which have been treated in accord with a theory having for its basis facts obtained from animal experiments. Eleven of these have resulted in recovery, and the beginning of improvement has in all followed immediately upon the commencement of the treatment. Since the mortality of tetanus is about 85 per cent. of all cases of the disease, and since in the unsuccessful cases there is reason to criticise the smallness of the dosage and the late commencement of the treatment, we cannot but feel that the results of the treatment afford striking corroboration of the theory upon which the treatment is based.

We shall see in a subsequent number that similar, though perhaps less convincing, results have attended the similar treatment of pneumonia.

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A STUDY OF ADDISON'S DISEASE AND OF THE ADRENALS.¹

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SINCE the description was published by Addison, in 1855, of the disease which bears his name, much study has been expended upon the etiology of this remarkable affection. The present research has been undertaken with the view of formulating such conclusions in regard to the etiology and symptomatology of Addison's disease as our still limited knowledge of the subject justifies. My personal experience includes three cases with autopsies, and to these are added three more, which are all that careful search discovered among the statistics for the past ten years of the New York and Presbyterian Hospitals. In addition, I have collected unreported records of 40 autopsies in which lesions of the adrenals have been noted, but without accompanying symptoms of Addison's disease.

In two exhaustive articles by Lewin (*Charité Annalen*, 1885, p. 630; 1892, p. 536), all cases of Addison's disease and of diseases of the adrenals which were reported prior to the latter part of 1891 were tabulated, to the number of 684. I have brought this work up to date, analyzing 73 more histories. This total of 757 cases recorded by many different observers constitutes a series large enough to afford definite data, since autopsies were made in nearly all.

The term "Addison's disease" strictly applies to an affection which, as described by Addison himself (*Dr. Addison's Works*, New Sydenham

¹ Read before the Association of American Physicians at Washington, May 30, 1893.
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Soc., 1868, p. 211), includes, among less characteristic features, extensive bronzing of the skin; but since in many instances the pigmentation is absent, while the other symptoms are decided, and are accompanied by the lesions common to the typical form, conclusions will be drawn from both classes.

The six new cases are here annexed. All were characterized by very decided bronzing of the surface of the entire body, which in one instance only was accentuated here and there by oval spots of a blacker hue. In addition, all the patients presented a group of definite symptoms, viz., great muscular weakness and prostration, indistinct heart-sounds, feeble pulse, pronounced gastric irritation with repeated attacks of nausea and of almost uncontrollable vomiting, mental apathy, and local pain.

In three of the cases in which autopsies were obtained, both adrenals were found softened and degenerated to a degree which entirely obliterated their original structure.

The first of the cases which came under my care was so unusual that it deserves special mention.

CASES OF ADDISON'S DISEASE PREVIOUSLY UNREPORTED.

CASE I.—The patient, J. A., was an intelligent Irishman, fifty years of age. He was admitted to the Presbyterian Hospital on May 5, 1891. He contracted syphilis several years before, and also suffered from frequent severe attacks of malarial fever during a three years' residence in Central America. Eight months before admission he noticed discoloration of the skin, general muscular weakness, and indigestion, especially of fatty food. He also had more or less diarrhœa, and for two months he suffered greatly from nausea and vomiting. On three occasions he was seized with sudden faintness, accompanied by severe pain in the right hypochondriac region. Five months before admission his skin began to darken and became more and more bronzed. The color appeared first upon the face and later upon the trunk and extremities. The intensity of the discoloration varied from time to time, but on the whole progressed quite rapidly.

On admission the chief complaint was of general muscular weakness. Physical examination of the lungs and abdominal viscera revealed nothing abnormal. Heart-sounds extremely feeble, pulse feeble, soft, compressible, 72. Respiration and temperature normal. Urine normal. Red blood-cells 1,922,000 per cubic millimetre. Body ill-nourished, but not emaciated. The face and hands were of a dull mahogany-brown color, the rest of the integument of a lighter brown.

After several days of rest and tonic treatment the patient gained in strength and was allowed to go out for exercise. After some hours he returned very hungry, and said that he had been evicted from three restaurants where he applied for lunch, on the ground that he appeared to be a negro, which indeed he resembled. After this experience he remained in the hospital, and became progressively weaker and mentally dull, with a rapid and extremely feeble pulse. He also had another seizure of pain in the right hypochondrium, which was very intense and

followed an evacuation of the bowels. The visible mucous membranes became pigmented.

The man suddenly developed pneumonia and died on the thirteenth day.

The *autopsy* showed both the adrenals to be normal. The liver exhibited syphilitic cirrhosis. The splenic capsule was thickened and adherent, and the spleen itself was soft. There was some thickening of the duodenal mucous membrane. Pneumonia was present at the base of the right lung. Nothing else of importance was observed.

CASE II.—S. H., male, thirty years old, German. Admitted to Presbyterian Hospital. No history of alcoholism or of syphilitic infection. Excepting several attacks of malarial fever, general health good until two years ago, since which time there have been frequent attacks of nausea and vomiting, with severe headache and anorexia. For the few weeks prior to admission, great languor and muscular weakness with increasing gastric distress and vomiting were present. Patient vomited constantly for three days, and complained of fever and sore-throat.

Examination on admission. Anæmia decided, emaciation extreme. The entire surface of the body, and especially the skin over the chest, scrotum, and thighs, is of a dusky brown color. The hue presents a uniform gradation from that of a light mulatto on the chest to that of a dark negro in the above situations. No isolated patches of pigment, no icterus, conjunctivæ normal, no discoloration of the buccal mucous membrane. Acute catarrhal tonsillitis is present. The heart-sounds are feeble, and a pulmonic anæmic bruit is heard. The free border of the liver extends to the umbilical line. Spleen moderately enlarged. Urine contains albumin with hyaline and granular casts. Temperature 100°. Pulse 92.

The patient continued to vomit, the heart action failed, pulmonary œdema ensued, and delirium was succeeded by drowsiness, coma, and death. The urine was retained for twenty hours before death, and the final temperature reached 105°.

Autopsy. Heart-muscle soft, valves normal. Lungs normal. Liver enlarged, cirrhotic, mottled with hemorrhagic spots. Kidneys in condition of acute parenchymatous nephritis. Adrenals: both enlarged and completely degenerated, filled with caseous débris, no gland-structures remaining. Semilunar plexus and adjacent sympathetic nerves appear normal. Spleen double the normal size, dark, soft, pultaceous.

CASE III.—H. W., male, forty-four years old, Englishman, waiter. Admitted to the Presbyterian Hospital. Previous history of moderate drinking, attacks of malarial fever, rheumatism, and syphilis. Since having rheumatism, four years ago, the patient has had occasional œdema of the lower extremities and moderate dyspnoea upon exertion. Nine weeks previous to admission he began to suffer from anorexia, nausea, and vomiting, and lost strength and flesh. One week before admission he was seized with severe pain at the base and left side of the chest, which was followed by a chill the next day. He also complained of a painful dry cough.

Examination on admission. General nutrition good. Entire surface of body moderately pigmented: darkest on hands, face, and genitalia. Hue that of a light mulatto. No patches of pigment. No pigmentation of visible mucous membranes. Pulse very feeble, 100. No cardiac bruit. Temperature 101°. Dry pleurisy at base of left side of chest. Liver-dulness diminished in area. Splenic dulness increased. Urine normal.

On the third day effusion appeared in the left pleural sac, the heart action becoming extremely feeble, and uncontrollable nausea with vomiting and distressing singultus ensued. Both stomach and rectum rejected all food. On the eighth day a general convulsion and pulmonary œdema occurred, and the patient died in coma.

Autopsy. Besides the fluid in the left pleural sac, large lipomatous growths were found projecting from the pleural surface of the diaphragm on the left side, in masses resembling a cock's comb, which were $1\frac{1}{2}$ to 2 inches long, and could be readily stripped off. Lungs œdematous, otherwise normal. Heart covered by a large layer of fat, valves normal, walls very soft. Liver small and slightly cirrhotic. Spleen enlarged by one-half and deeply pigmented. Kidneys surrounded by fat. They show early stage of chronic diffuse nephritis. Adrenals: each as large as a hen's egg, cortex completely caseous, medulla somewhat softer, but without pus. Not a trace of original structure remaining. Both surrounded by large accumulations of fat. No abnormality of semilunar ganglia observed.

CASE IV.—S. M. H., female, fifty-seven years old. Twenty months before her death, while in apparent good health, patient observed dark brown spots which first appeared on the neck, then on thighs and hands. Since then bronzing has become diffuse, and the patient has had occasional attacks of anorexia, nausea, vomiting, and prostration. She was twice admitted to the New York Hospital, with a year's interval. The first time that she entered the hospital her symptoms were mainly nausea, vomiting, epistaxis, insomnia, and muscular weakness, with moderate bronzing. After a few days the patient was discharged improved. Five weeks before admission for the second time, patient had severe vomiting, headache, constant pain in left hypochondrium, followed by rapid loss of flesh and strength. Has at times passed almost no urine, at other times has had moderate polyuria. Frequent epistaxis occurred.

On admission the integument was found deeply bronzed over the entire body, but especially so where exposed to the air. Conjunctivæ not pigmented, but lips and buccal mucous membrane spotted with dark gray patches. Anæmia was observed with marked asthenia, mental hebetude and despondency, and the pulse was weak, small and compressible. The patient died quite suddenly the same day of asthenia.

Autopsy. Body fairly nourished, rigor mortis well marked. Entire body distinctly bronzed with the exception of an old cicatrix one and a half inches in diameter in centre of forehead. Peritoneum, showing adhesions between liver and other viscera, and about the spleen. Heart brown, size normal, valves normal. Lungs, spleen, stomach, and intestines all normal. Liver small, cirrhotic, and pigmented. Brain and its membranes normal. Kidneys small, with adherent capsules and a few superficial cysts; cortex thin and markings indistinct. Adrenals: normal in size but irregular in thickness and nodular; cortex and medulla not distinguishable, studded with small caseous masses. Microscopic examination shows many small caseous areas surrounded by masses of young cells, with numerous giant-cells among them. No trace of original structure of medulla or cortex.

(The two following histories are incomplete in that they are without autopsies, but they illustrate the correlation of the symptoms of asthenia, pigmentation, vomiting, feeble pulse, etc.)

CASE V.—J. P., male, twenty-two years old, waiter, Englishman. Ill but two weeks with great muscular weakness with mental apathy. On admission to the New York Hospital the patient's condition was as follows: General nutrition good; no visceral lesion discoverable on physical examination, but the urine contains granular and hyaline casts. Blood examined and found normal. There was decided bronzing of a large surface of the body, especially over the chest and abdomen. The nipples were quite black. The patient appeared in a condition of melancholia, obeying when directed, but refusing to speak, and he would not voluntarily move or change his expression. Emaciation soon followed and became extreme.

After six weeks of treatment the mental condition failed to improve, and the patient was transferred to another institution.

(For the privilege of abstracting the two previous histories I am indebted to Dr. Peabody, in whose hospital service they occurred.)

CASE VI.—E. T., female, forty-six years old, laundress, Irish. History of occasional attacks of rheumatism and malarial fever. For sixteen months prior to admission to the New York Hospital, following exposure to cold and wet, the patient had occasional attacks of intense pain in the backs and hips, vertigo, headache, and severe vomiting. On admission, complained of shortness of breath, nausea, vomiting, and asthenia. Patient has noticed great variations in the quantity of urine at various times. Bowels constipated. For a year patient's skin has been growing uniformly dark, with brown spots on hands and body. Physical examination failed to reveal any visceral lesion. General nutrition good. Heart sounds very feeble, but without bruit; pulse 98, weak. Entire surface of body dark brown, inclining to black in certain regions. On the hands, feet, and body there were a few oval spots of darker hue than the surrounding skin. After some days of treatment the patient was discharged somewhat improved.

LESIONS OF THE ADRENALS.

Disease of the adrenals occurring as the sole lesion observed of any importance is recorded in nearly one-half of all cases, while in a further large number it accompanies, or is secondary to lesions elsewhere. But we are obliged to abandon the earlier theory that Addison's disease is etiologically dependent upon adrenal lesion, in view of the fact that many typical cases have lately been observed, such as one just cited (Case I.), with well-marked bronzing, in which the adrenal bodies were entirely normal. Among Lewin's histories 12 per cent. were of this type. Virchow describes a typical case with pigmentation, in which the microscopic examination of both the adrenals and sympathetic system presented nothing abnormal. Moreover, it is well established that every variety of adrenal lesion which has ever been found associated with Addison's disease has also occurred without giving rise to any symptoms whatever.

A most instructive case is related by Jürgens, where the pressure of a large aneurism caused atrophy and degeneration of the left splanchnic

nerve with typical bronzing and other symptoms of Addison's disease, whereas the adrenals remained entirely normal.

In addition to the 40 cases of adrenal lesions which I have collected from hospital records, the existence of which gave rise to no symptoms of Addison's disease, are 72 others recently reported, making in all 112. Such cases must be common in the experience of anyone who is especially looking for them. The 40 unpublished notes are as follows:

CASES OF LESIONS OF THE ADRENALS ACCOMPANIED BY NO BRONZING OR ANY OTHER SYMPTOMS OF ADDISON'S DISEASE.

A. *Lesions other than simple fatty infiltration.*

CASE I.—Pleurisy, with effusion; hydro-peritoneum. Liver mottled and congested. Left kidney slightly enlarged, pale, with thickened cortex. Adrenals: normal in size, but cortex strongly pigmented (yellow).

CASE II.—Acute pleurisy, with effusion and ulcerative endocarditis. Liver infiltrated with fat; stomach mucous membrane dotted all over with a large number of petechial spots; kidneys showing diffuse nephritis. Adrenals: softened at centre, normal in size.

CASE III.—Cardiac valvular lesions and fibrinous pleurisy. Liver cirrhotic; capsule adherent to diaphragm. Kidneys: right waxy, left very large, filled with abscess cavity; left ureter obliterated and converted into dense connective tissues. Adrenals: both enlarged, with areas of yellow softening in medulla, cortex thickened and yellow in patches.

CASE IV.—Incarcerated hernia; gangrene of thigh. Adrenals: both enlarged and the seat of numerous hemorrhages and spots of softening.

CASE V.—Pernicious anæmia. Adrenals: both enlarged and cystic.

CASE VI.—Pulmonary embolism; large carcinoma of right supra-renal (left normal). No pigmentation of skin.

CASE VII.—Carcinoma of stomach. Hemorrhage in right supra-renal capsule.

CASE VIII.—Interstitial nephritis. Supra-renals much atrophied.

CASE IX.—Chronic diffuse nephritis. Adrenals: both cortices fatty. Interior of right completely degenerated.

CASE X.—Lobar pneumonia; chronic diffuse nephritis. Adrenals: both cortices fatty; right also cystic.

CASE XI.—Tubercular osteitis. Acute general miliary tuberculosis. Adrenals: both markedly increased in size, and containing many small grayish degenerated tubercular nodules.

For the notes of Cases IV. to XI. and for most of the cases of fatty adrenals cited below, I am indebted to Dr. Farquhar Ferguson, Pathologist to the New York Hospital, and to his assistant, Dr. George P. Biggs.

The reports of cases XII. to XXV. have been kindly given me by Dr. John S. Thacher, with whose permission I present the following notes: He says: "I have gone over the records of my autopsies at the Presbyterian Hospital, St. Luke's Hospital, and the State Emigrant Hospital. There are 971 of these in which the abdominal organs were examined. In most of them the condition of the adrenals was observed, and in the

majority (575) it is found noted. In only 15 is it recorded as abnormal, certain variations in size, color, and consistence which are commonly met with not being classed as abnormal."

[One of these cases was genuine Addison's disease, and is referred to elsewhere; the remaining 14 are as follows:]

CASE XII.—April 12, 1889. Pulmonary tuberculosis, pneumothorax. Left adrenal contains a yellow nodule moderately firm. Right adrenal the same, but contains nodule three-quarter inch in diameter.

CASE XIII.—February 15, 1890. Tuberculosis of genito-urinary tract, lungs, intestines, cerebellum, cord, and adrenal. Left adrenal almost entirely replaced by a cheesy mass. Right adrenal normal.

CASE XIV.—July 13, 1890. Cancer of cardiac end of stomach; cancer of mesenteric and retro-peritoneal glands and liver; chylous ascites. Left adrenal contains white carcinomatous nodules.

CASE XV.—January 30, 1891. Fractured ribs; hemorrhage into pleura; acute pleurisy; hemorrhage into spleen; complete fracture of ulna. Left adrenal contains a nodule about one-third inch in diameter, rather soft in consistence, pinkish-yellow in color. Right adrenal contains a nodule like the other, but flattened, grayish in color, separating readily from the rest of the organ. Microscopic examination: cells fatty.

CASE XVI.—April 3, 1891. Chronic cystitis; chronic pyelo-nephritis. Right adrenal firm; on section found to contain a few pea-sized, firm, yellow masses. Left adrenal contains nodules like the right. Microscopic examination: typical tubercular inflammation.

CASE XVII.—February 8, 1892. Grippe; facial erysipelas; pneumonia. Left adrenal extremely thin, gray, of normal consistence; right adrenal the same. Microscopic examination: many leucocytes in spots; new connective tissue in some parts. The adrenal cells are some of them proliferated, some of them degenerated.

CASE XVIII.—April 2, 1892. Cancer of œsophagus; gangrene of lungs; gastrotomy. Left adrenal contains a nodule one-half inch in diameter. Right adrenal contains a similar nodule one inch in diameter. Microscopic examination: carcinoma, typical.

CASE XIX.—May 5, 1892. Chronic pulmonary phthisis. Left adrenal normal, except a pea-sized, yellow, caseous nodule.

CASE XX.—September 2, 1891. Tubercular ulcers of intestines; perforation; peritonitis. Left adrenal, one end enlarged; on section shows a grayish, moderately firm mass three-quarters inch in diameter. Right adrenal the same. Microscopic examination: section consists almost wholly of small cells, little larger than leucocytes, mostly not round, but pea-shaped and irregular, no alveoli; looks like sarcoma.

CASE XXI.—January 25, 1893. Chronic tuberculosis of hip-joint; waxy degeneration of liver, spleen, and kidneys; broncho-pneumonia; acute pleurisy. Left adrenal appears normal. Microscopic examination: typical tuberculosis.

CASE XXII.—October, 1889. Cancer of lungs, heart, liver, kidneys, and adrenals. Latter contain small nodules one-quarter inch in diameter.

CASE XXIII.—February 17, 1892. Paris-green poisoning; acute gastro-enteritis. Right adrenal contains a yellowish nodule about one-half inch in diameter, a little softer than the rest of the organ. Left adrenal normal. Microscopic examination: mass of adrenal cells in

rather irregular alveoli, most of them in a state of marked fatty degeneration; a little infiltration of leucocytes at the periphery.

CASE XXIV.—March 26, 1892. Chronic nephritis; cirrhosis of liver; cardiac hypertrophy and dilatation. Right adrenal is replaced by a mass about twice the size of the normal organ, gray and granular. Left adrenal normal. Microscopic examination: typical tubercular inflammation.

CASE XXV.—April 21, 1893. Chronic cystitis; abscess of seminal vesicle; external urethrotomy; pyelo-nephritis; miliary tuberculosis of lungs. Both adrenals contain cheesy nodules. Microscopic examination: cheesy spots surrounded by infiltration of small cells and epithelioid cells; probably tubercular.

"I recall also two cases of diseased adrenal, not contained in the records mentioned. One was an employé at the State Emigrant Hospital, who slowly and gradually became anæmic and asthenic, but no cause could be detected. His color was very white. After autopsy the adrenals were found cheesy.

"The other was a patient in the Colored Hospital. I can only recollect that at the autopsy the adrenals were cheesy and the tongue showed brown patches, and it was concluded that he had died from Addison's disease." (Thacher.)

The following case (XXVI.), as well as Case XL., was kindly examined for me by Dr. Warren Coleman, Instructor in Pathology, Loomis Laboratory, New York:

CASE XXVI.—Catarrhal pneumonia; cheesy foci in lungs; cardiac hypertrophy and dilatation; kidneys hard, congested, surface rough, cortex diminished. Adrenals: right normal; lower portion of left degenerated and converted into a white homogeneous substance. Microscopic examination shows the cells not filled with fat but with scanty protoplasm, leaving the nuclei intact in the centre of a reticulum. No necrotic areas; no congestion. Only a few normal cells are found, chiefly in the zona glomerulosa.

Semilunar ganglia (of both sides): The nerve-cells are distributed unequally throughout the ganglia. In many instances a definite sheath can be made out around them. Nerve bundles run through the ganglia at different points. Between the cells there is connective tissue with long oval nuclei resembling the nuclei of involuntary muscle. The tissue is most abundant where the cells are fewest. The nuclei are normal in shape. Nucleoli prominent. Many of the cells are pigmented with small golden-brown granules scattered through the protoplasm. They resemble hematoidin granules.

B. *Fatty changes.*

CASE XXVII.—Cirrhosis of liver. Adrenals both contain considerable fat in the cortices, more abundant in the left than in the right.

CASE XXVIII.—Croupous pneumonia. Adrenals both very fatty.

CASE XXIX.—Lobar pneumonia. Adrenals both contain fat in the cortices.

CASE XXX.—Cirrhosis of liver; pulmonary tuberculosis; chronic diffuse nephritis. Adrenals both contain much fat in the cortices.

CASE XXXI.—Lobar pneumonia. Right supra-renal body normal. Left contains much fat.

CASE XXXII.—Ulcerative endocarditis; aortic insufficiency. Adrenals: both cortices fatty.

CASE XXXIII.—Lobar pneumonia. Adrenals: both cortices fatty.

CASE XXXIV.—Lobar pneumonia (bilateral). Adrenals both contain considerable fat.

CASE XXXV.—Aneurism of thoracic aorta; pneumonia; chronic diffuse nephritis. Adrenals both very fatty, the fat irregularly distributed throughout the cortex in patches of various sizes.

CASE XXXVI.—Chronic diffuse nephritis; entero colitis. Adrenals both very fatty.

CASE XXXVII.—Myocarditis; diffuse parenchymatous nephritis. Adrenals both contain a great deal of fat diffused throughout their entire cortices.

CASE XXXVIII.—Aneurism of thoracic aorta; lobar pneumonia. Adrenals both very thick, and contain much fat in cortices.

CASE XXXIX.—Pyo-pneumothorax; pulmonary tuberculosis. Adrenals both very fatty.

CASE XL.—Dilatation of aorta; cardiac hypertrophy; miliary tubercles in lungs; kidneys small, capsule adherent, markings indistinct. Adrenals—microscopic examination: majority of cells in zona fasciculata contain small fat globules of various sizes, or one large globule displacing the nucleus. Some of these cells are distended. Other cells have lost their nuclei and are granular and necrotic. Portion of medulla next to cortex normal, except for congestion, which is evident throughout the section.

The entire list of 112 cases, without symptoms of Addison's disease, includes: Extensive pigmentation; cloudy swelling from cases of infection from pathogenic organisms (*Brit. Med. Journ.*, May, 1889); atrophy, infiltration with small, round cells; fatty infiltration; tubercular inflammation (with bacilli); several simple cysts; two cases of hemorrhagic cyst; one of gumma; and a number of adenoma, sarcoma, and carcinoma.

Twice the supra-renal bodies have both been congenitally absent (Martini, *Comptes rendus*, 1856, xliii. p. 1053; Spender, *Brit. Med. Journ.*, September 11, 1858); and four times either the right or left has existed alone. Dr. Hartley recently told me that he has removed a supra-renal capsule in connection with excision of the kidney without the subsequent occurrence of any noteworthy symptoms.

In view of the opposing facts, the immediate causative relation of supra-renal lesions to the symptoms of Addison's disease cannot be easily maintained, in spite of their frequent coincidence, and we must seek a further explanation in the relation between the adrenals and the sympathetic nervous system. To this subject it will be convenient to return.

ADRENAL TUBERCULOSIS.

Two facts must be admitted regarding adrenal tuberculosis :

First. The supra-renal bodies are far more susceptible to tubercular inflammation than to any other form of disease.

Second. Addison's disease occurs oftener in conjunction with tuberculosis than with all other diseases together, or in approximately 80 per cent. of all cases. Hence, when tuberculosis invades the adrenals Addison's disease usually develops, although other and more important factors may be concerned in the process.

We find all the later stages of tubercular inflammation and of tubercular deposits in the adrenals, but their exact nature and extent have never been shown to bear any definite relation to the accompanying symptoms. Tubercle bacilli have been reported as present in the adrenals in a score of cases, but more often they are not found. In three recent instances the adrenals have given very marked reaction to inoculation with Koch's tuberculin, and in one of these there was extensive hemorrhage into the degenerated supra-renal body. In the great majority of cases both adrenals are involved ; when the tubercular process is present in but one, the left is affected twice as often as the right.

The local tuberculosis frequently commences as a primary chronic inflammation, interstitial, and accompanied by the formation of small tubercles, which enlarge, coalesce, and degenerate to caseous masses that may soften and honeycomb the entire adrenal structure with cavities which are often described as containing pus, though the material is usually simple granular débris with oil globules. This substance may be replaced by calcareous matter, and sometimes, but less often, atrophy ensues. The inflammatory process commonly begins in the medulla and extends to the cortex, gradually obliterating all original structure, but the reverse may be the case, or both may be simultaneously affected. Adhesions and thickened masses of connective tissue, or deposits of fat, are very apt to form about the adrenal bodies, and it is important to note that such changes often involve or include the adjacent sympathetic nerve and ganglia.

THE RELATION OF ADDISON'S DISEASE TO OTHER DISEASES
THAN TUBERCULOSIS.

This subject deserves brief mention.

Malarial Fever.—The accompanying anæmia in Addison's disease, and the fact that the spleen has certain physiological influences in regard to the chief pigment of the body, suggests the question whether malarial fever is associated in any special manner with the former affection. In the cases which I have personally seen there had been many attacks of malarial fever. Other observers have commented upon a similar coincidence. Lewin reports forty-five cases. But it has not been shown

that Addison's disease is more frequent in those regions where malaria is most severe, nor does it bear any constant relation to malarial paroxysms when the two diseases coincide. The spleen is sometimes hyperæmic and is pigmented in Addison's disease, but it is frequently normal, and our present knowledge does not enable us to recognize an etiological relation between the two affections.

Carcinoma.—With regard to carcinoma of the adrenals, whether it involves them primarily, as it has been rarely known to do, or by extension from contiguous organs, it is a remarkable fact that, as a rule, this lesion does not provoke either pigmentation of the skin, or typical symptoms of Addison's disease. Such a result has only once or twice been recorded (Fleiner, *Berl. klin. Wochenschr.*, December 23, 1889). The same may be said of sarcoma and adenoma.

Caries.—Several cases of vertebral caries have occurred in conjunction with symptoms of Addison's disease, in which the local sympathetic system was also more or less involved.

Goitre.—Three cases of coincident exophthalmic goitre have been observed. This fact is of special interest from the possibility of a connection having existed between abdominal and cervical sympathetic nerve lesion or irritation.

In general, it must be admitted that no other disease than tuberculosis accompanies Addison's disease with sufficient frequency to be regarded as among predisposing causes.

Traumatism, or strain affecting especially the muscles of the back, has been reported several times as the exciting cause of Addison's disease in cases in which tuberculosis could be excluded.

In one instance the disease followed immediately upon a severe wrench of the back acquired while skating, and in another a fall into ice-cold water. Several cases have developed in connection with psoas and lumbar abscess from injuries of the spine.

AGE.—Addison's disease was originally held to belong only to adult life. Lately, however, two cases have occurred in infants only seven days old, and in one eight days old. All showed distinct bronzing. In one infant one adrenal was cystic and not caseous. Girode (*Bull. de Soc. Anat.*, April, 1891) reports the history of a newborn infant who had syphilitic adrenal gummata, without bronzing. Addison's disease has been observed in almost every year of life from birth to the eighty-first.

SEX.—Sixty per cent. of all cases occur in males.

DURATION.—While the average duration of all cases is from two or three months to a year, there are remarkable exceptions. One patient has lived ten years and another nearly eleven years (Schreiber, *Berl. klin. Wochenschr.*, October 13, 1890; Schmaltz, *Deutsche med. Wochenschr.*, September 4, 1890). A number of others are reported as

living respectively four, five, seven, and eight years after pigmentation was first observed.

It is difficult to account for the prolongation of life in a few cases of a disease which is otherwise so uniformly fatal at an early date.

SYMPTOMS. Pigmentation.—The belief that adrenal lesions are responsible in any direct manner for the bronzing of the skin, and sometimes the mucous membrane, is not sustained by analysis of reported autopsies. The theory has been advanced that the adrenals were more glandular structures than nerve organs (Virchow), and that the bronzing is due to a glandular chromogenic action of the supra-renal bodies. In other words, first, that they either alter normal hæmoglobin, constantly passing through their abundant bloodvessels, and return it to the blood; or, second, that they form new pigment when diseased; or, third, that, becoming diseased, a certain controlling influence ordinarily exerted over the blood pigment is removed. Many facts derived from a careful study of the embryology, physiology, and pathology of the adrenals are arrayed against these views.

The adrenals have long been known to furnish peculiar color reactions (Vulpian et Baunie, *Gaz. hebd. des Sci. Méd. de Bordeaux*, 1888, No. 11). They become reddened by oxidation in light and air, are blackened by per-salts of iron, and turned green by dilute iodine solutions. Klebs has claimed that following irritation a chromogenic body is stored in the adrenal cortex in increased amount.

I have repeated the color test with the adrenals of man and nearly all the domestic animals, and have never found them to fail. The deep green produced by brushing the freshly cut surface with sesqui-chloride of iron affects the medulla and not the cortex. This reaction is unique. Notwithstanding the peculiar color reactions, there is no conclusive evidence that the pigmentation of Addison's disease depends upon alterations in the blood; for the bronzing is often great while the blood is normal and no excessive pigment has been found in it, neither is the urinary pigment increased. The only remaining hypothesis is that there is some peripheral sympathetic influence at work which causes the deeper cells of the rete Malpighii to appropriate and alter the blood pigment which circulates in the capillaries among them. This pigment is found in the protoplasm of the younger cells in the situation where it is normally present in the negro in excess (Sjostrom, *Deutsche med. Wochenschr.*, May 30, 1889). Jürgens (*Deutsche med. Zeitung*, May 10, 1888), believes that some pigmentary substances may be deposited through peripheral nerve excitation, originating in epithelial degeneration or external irritation, hence the pigmentation is most decided where the skin is exposed, in the face and hands, on flexures and folds, etc.

Gade (*Fortschritte der Med.*, 1889, No. 12, p. 452), who has found pigmentary deposits in large branching cells in the velum palati and tongue,

as well as in other mucous membranes and the skin, believes that the bronzing of Addison's disease is not the result of any specific action, but is merely an increase in the normal amount of pigment locally deposited from the hæmoglobin.

The fact has been confirmed by many observers (Lancereaux, Nothnagel, Fleiner, *et al.*), that the pigmentation occurs most prominently in those cases in which the sympathetic nerves are found diseased. I have been told by Dr. C. S. Bull that he has examined the eyes of a number of patients with Addison's disease, but never found increase of pigment in the fundus oculi, though in one case it was present in excess in the iris.

I have referred to 112 cases of adrenal lesion in which no bronzing appeared at any time. These abnormalities were of great variety, covering the range of pathological changes from simple hyperæmia to advanced caseation or calcification of the entire adrenal structure, yet at no period were the integument or mucous membranes pigmented in the slightest degree.

If the pigmentation of the surface depended upon functional derangement merely of the adrenals, by abolishing a control over the normal blood pigment, surely it could not be absent throughout widespread progressive destruction of their tissue. On the other hand, it cannot be alone due to new pigment formed by the supra-renal bodies, for fully twelve per cent. of all cases of typical Addison's disease have been unaccompanied by any adrenal lesion whatever.

Chemical analyses (Thompson and Costello) of the supra-renal bodies, in addition to the excess of pigment above described, shows that they contain leucin and myelin in quantities out of proportion to the number of nerves, also traces of hippur taurocholic, and benzoic acids, but nothing which is peculiar to the adrenals, or which is not found in other situations in the body in greater amount.

OTHER SYMPTOMS AND VISCERAL LESIONS IN RELATION TO ETIOLOGY.

Careful analysis of the symptoms recorded in all cases of Addison's disease shows considerable uniformity in the occurrence of functional or other disorders of the alimentary canal and of the circulation, and suggests very forcibly the probable existence of a common cause to be found in disturbance of the abdominal sympathetic system.

Vomiting—In almost every case nausea and vomiting are present, and with asthenia they are often the first symptoms observed. The vomiting, at first paroxysmal, occurring at very irregular intervals, becomes more and more frequent and severe. It is not referable to errors in diet, nor to gastric lesions. In a few instances slight gastritis or hyperæmia or pigmentation of the mucous membrane of the stomach have been noted, but these conditions are neither frequent nor prominent enough to account for the severe emesis.

It has been suggested that this symptom is due to an altered condition of the blood, or to the presence of some toxin generated by the suprarenal bodies. But the vomiting may occur long before there has been time for alterations in the composition of the blood to appear, and the latter are usually neither frequent nor serious. It seems more probable that the emesis is due to an irritation of the celiac plexus, which reaches the vomiting and respiratory centres through branches of the vagus nerve. We have many proofs of the possibility of this occurrence, and a functional irritation of the sympathetic nerves even without destructive lesion may be a sufficient factor, as in the vomiting of pregnancy, forms of severe abdominal pain like that accompanying the passage of gallstones, or renal calculi, certain ovarian diseases, etc.

Diarrhœa.—The same argument may be employed to account for the diarrhœa which is so commonly present. This is found to be more than twice as frequent as constipation, which as a rule occurs only at the commencement, and as in the case of vomiting, it does not bear any definite relation to errors in diet, nor is it excited by other common influences, such as exposure to changes in temperature, intestinal hyperæmia, etc. Lesions of the intestine, excepting occasional hyperæmia and ecchymosis, and cases where general tuberculosis with ulceration exists, are so rare as to be regarded merely as coincidences. On the other hand, there is much experimental evidence in favor of the belief that diarrhœa, like emesis, is produced in this disease by splanchnic irritation rather than by altered blood or any other agency.

Lewin and Israel have shown that removal of the celiac ganglion produces at first constipation and later diarrhœa, and the musculo-motor and vasomotor impulses which emanate from it may be so modified by experimental irritation as to alter peristalsis, or produce local anæmia or hyperæmia. These results have been confirmed by others. In animals extirpation of the solar plexus gives rise to hyperæmia, ecchymoses and ulceration in the wall of the stomach and upper portion of the small intestine.

In a few instances atrophy or swelling and pigmentation of the solitary and Brünner's glands and Peyer's patches have been recorded, and this may be explained by the influence of the celiac plexus through altered trophic impulses. That these lesions are not more frequent may be due to the fact that the trophic influence is not very strong, or it is modified by the local plexuses in the intestinal wall.

Nothnagel has shown a relation to exist between atrophy of the intestinal wall and atrophy of the intestinal sympathetic plexus, although the splanchnic nerves were intact.

Changes in the other abdominal viscera are neither frequent nor extensive, and consist mainly of hyperæmia, which might also be due to sympathetic irritation or lesions.

The spleen has been found hypertrophic and often soft and pigmented, but it has been pointed out that the occurrence of coincident malarial fever with Addison's disease is not unusual.

The liver may be hyperæmic, cirrhotic, tubercular, or, as in one of my cases, syphilitic. There is nothing characteristic of Addison's disease in its various lesions. The mesenteric glands are frequently enlarged and caseous, but this is mainly in distinctly tubercular cases.

The kidneys and urine are usually normal, and mellituria has not been observed. Hyperæmia and moderate hypertrophy of the kidneys are reported in a few instances. This is also possibly due to blood stasis or altered blood-pressure produced through splanchnic irritation.

Pain and Tenderness.—In fully one-third of the cases, sharp neuralgic, or more often severe dull aching pains are present, and referred principally to the lumbar region, but also to the deep epigastric and hypochondriac region. The pain in most cases has been accompanied by extreme local soreness and tenderness on pressure (Henry, *Trans. Path. Soc. Phila.*, vols. v., x). Müller (*Handb. der Physiol.*, i. p. 579), and Höffter (*Henle u. Pfeuffer's Zeit.*, N. F., iv. S. 322), have demonstrated that experimental irritation of the celiac ganglion gives evidence of acute sensibility; and severe colic may, of course, occur independently of serous or intestinal muscular lesions. It seems, then, probable that the lumbar and abdominal pains of Addison's disease may emanate from splanchnic irritation.

The Lungs.—In about two-thirds of the cases the lungs or bronchial glands have been affected in various ways. The majority of cases are tubercular. In other instances hyperæmia, œdema, and pigmentation are recorded with pleuritic adhesions. Caseation and hypertrophy of the bronchial glands have been reported. The frequent occurrence of tubercular degeneration of the adrenals is thus explained in many instances as a secondary involvement, following the primary infection of intra-thoracic tissues.

The Pulse.—The modifications in the circulatory system are mainly referable to the pulse, which is uniformly small, compressible, and feeble, and usually rapid in the latter stages of the disease. Heart lesions are infrequent and the valves are usually normal. Atrophy of the heart has been observed twenty-seven times, and hypertrophy, brown pigmentation and fatty degeneration have occasionally been found. These conditions are too infrequent to account for the enfeeblement of the pulse, and since the latter may be present in acute cases when the blood appears normal, and before the general nutrition of the patient is seriously impaired, it is highly probable that it is due to functional or reflex disturbances of the circulation coming from the abdominal sympathetic system.

When the vasomotor tone in the splanchnic system is lowered by experimental irritation, the general arterial pressure is reduced, producing cerebral anæmia and lessening the vagus tone. As a further result, the

pulse becomes quick, small, and compressible. The theory is advanced by Henry and others that paralytic distention of the abdominal blood-vessels is produced through functional or organic causes by their acting upon the sympathetic system, disturbing the equilibrium of the circulation.

The central nervous system exhibits no typical lesions. Cerebral anæmia and hyperæmia are both recorded in about a dozen cases. Vertigo is frequently observed, and there is often mental weakness and depression, with loss of energy. In protracted cases delirium and coma result, and in a few convulsions have been present. It is not uncommon for death to occur very suddenly through a condition resembling shock, or as it sometimes follows severe blows upon the abdomen. Patients are very apt to show more or less lethargy and mental dulness.

The asthenia, which is usually pronounced, appears so early that there is no muscular atrophy and no loss of adipose tissue, and it is difficult to believe that it is not due to nervous influences rather than to changes in the blood, or malnutrition. Dyspnoea may accompany this condition.

The Blood.—Anæmia is common but by no means extreme, and careful clinical study of the blood fails to establish satisfactorily the theory that the disease is essentially a blood disease. Free pigment is not found. While the red corpuscles may be diminished in number they do not appear otherwise abnormal, and in certain typical cases anæmia has not been present. In some of the more acute cases the symptoms become well marked before the general nutrition has been appreciably impaired. The hypothesis that the symptoms are due to a toxin developed by the adrenals and discharged into the blood is not supported by evidence of value, and many facts are directly opposed to it. Ecker first described the adrenals as blood glands, in 1846, before Addison's disease was thought of, and recent inoculation experiments with the thyroid and various gland substances, and the general belief that the chemical composition of the blood is normally influenced by many different organs of the body, tempt one to regard the adrenals as possibly possessing a similar control, but the experiments upon animals, which I will presently report, fail to support this theory.

Rare symptoms have occasionally been observed complicating the usual type of Addison's disease, and they are of interest only in connection with the possibility of origin through extreme irritation of the sympathetic nerves. One instance of salivation is reported, one of bromidrosis, and one of nutritive disturbance in the mammae, uterus, and other female generative organs. The mammae and ovaries were greatly atrophied (Kleinwachter, *Lancet*, January 25, 1891). The disease has once been observed in a "bleeder." (Schmaltz, *Deutsche med. Wochenschr.*, September 4, 1890.)

The group of symptoms above considered—namely, the nausea; irritable paroxysmal vomiting and diarrhoea; localized lumbar and epigas-

tric pain; enfeebled pulse; mental apathy and prostration; and the hyperæmia—all point toward a common origin in a lesion which excites or irritates the abdominal sympathetic system, and not necessarily the semilunar ganglion alone, but at times the stomachic, hepatic, or mesenteric plexuses.

EXPERIMENTS UPON ANIMALS.

For the past four months I have been experimenting at the Loomis Laboratory upon the supra-renal capsules of various animals.

Without entering too much into details in this paper, I will briefly state the results: The experiments were performed upon the cat, dog, rat, guinea-pig, and rabbit, and consisted of transplantation, excision, and destruction of the adrenals, and inoculations of aqueous and glycerin extracts made from the adrenals of these animals, and from man in a case in which the capsules were obtained from an autopsy six hours after death from chronic cardiac disease.

Transplantation was performed by inserting the freshly excised adrenals from an animal of one species in the abdominal wall or abdominal cavity of another. After a few days or a week the adrenals were found degenerated, softened, and apparently undergoing absorption.

Excision of the adrenals is one of the most difficult operations which I have ever undertaken upon animals, especially in the dog. They are so deeply situated that they are difficult to reach from behind, on account of the thickness of the muscles of the back, and if approached from the front or side, so much displacement of overlying organs is necessary that irritation or injury of adjacent nerves is unavoidable. Moreover, in all the animals used, a very large vein from the abdominal muscles lies directly across the ventral surface of the adrenals in a groove which divides them into two lobes connected with a narrow isthmus. This vein is joined by a relatively large branch from each supra-renal body. The latter usually lies on the right side in direct contact with the vena cava, and on the left with the renal vein. It is therefore almost impossible to ligate the muscle vein, and of course hemorrhage from such a large branch of the vena cava or renal vein is soon fatal. To obviate this occurrence I have destroyed the adrenal bodies by the actual cautery. Animals thus treated make a good recovery and exhibit no symptoms. There is no increase in pigment of the mucous membrane or elsewhere, the blood is normal and digestion is good. A similar lack of symptoms is observed after transplantation of the glands.

A curious fact in relation to the adrenals has been observed by Stilling (*Virch. Arch.*, December, 1889), namely, that in a young animal after extirpation of one of these bodies the other hypertrophies to a considerable extent. The result would seem to indicate that the organ is not a mere relic of the embryonic state, but is of some functional value.

Ablation of both adrenals is reported by many observers to cause death within a period varying from a few days to several weeks, and Tizzoni claims to have found resultant lesions of the nature of alterations in the walls of bloodvessels, hemorrhages, extravasations, and disturbances of the lymphatic circulation. He also claims to have observed in connection with the brain and cord, infiltration with leucocytes and fibrinous exudation, but these results have not been corroborated by any of the numerous experiments made by others when careful antisepsis is maintained.

Arnaud, Marino-Zucco and Guarnieri have extracted substances from fresh supra-renal bodies which they describe as acting as toxins. After using rigid antiseptic precautions they found that injection, even in small doses, of these materials subcutaneously or into the veins of dogs, rabbits, and guinea-pigs, produces death in a short time.

One substance isolated by them is described as a phospho-glycerate of neurin. I have made a number of inoculation experiments upon animals with glycerin and aqueous extracts prepared from the freshly excised adrenals, and am convinced that if proper antiseptic precautions are employed, the supra-renal bodies possess no toxicity when ingrafted or inoculated in animals.

An extract of both adrenals from a dog injected into another dog or into a cat or rabbit, seems entirely without effect. In some cases I repeated the inoculations with the extracts several times in the same animal, which was kept alive for two months without symptoms.

Jaboulay (*Lyons Méd.*, November 2, 1891), has described the occurrence of accessory supra-renal bodies situated upon the semilunar ganglion and in the midst of the solar plexus. I have several times observed these supernumerary bodies, and they have been reported as occasionally present in man.

Lesions of the Sympathetic System.—It is greatly to be regretted that thorough microscopic examination of the abdominal sympathetic nerves and ganglia has not been more frequently made in the reported cases of Addison's disease, for there is good reason to believe that lesions can be very often found in these structures. The earlier records are practically valueless in this regard, for they were made at a period when the technique of nerve preparation and staining was very imperfect as compared with present methods, and slight lesions even if sought for might easily have escaped observation.

The research of the past four or five years, however, is constantly bringing to light an increasing proportion of cases of Addison's disease in which the condition of the various sympathetic nerve structures is shown to be abnormal. The ganglia are often excessively pigmented, sometimes hemorrhagic. They may exhibit fatty degeneration, swelling, and even caseation and suppuration. Their nerve-cells are atrophied,

the vessel walls are thickened and infiltrated, the nerves have a thickened perineurium, and there may be degeneration of the axis cylinders. Such degenerative changes have been lately observed in the splanchnic, in the semilunar and solar ganglia, and in the plexus surrounding the abdominal aorta. Fleiner (*Berl. klin. Wochenschr.*, No. 22, 1891), gives an account of two typical cases in which signs of inflammation were present in the ischiatic, crural, median, and vagus nerves. In one case there was a neuritis of the lower posterior spinal nerve roots, and some degeneration of the posterior columns of the cord. (Kalindero and v. Bates, quoted in *Schmidt's Jahrb.*, No. 1, 1893.) Such cases may be coincident with adrenal degeneration or occur without it; not infrequently the diseased adrenals are adherent to surrounding organs, and various sympathetic nerve branches are included in the proliferated connective tissue.

Armand and Alezais (*Semaine Méd.*, October 7, 1891; *Marseilles 1^{re} éd.*, January 30, February 28, March 30, 1892) have examined microscopically the lesions of a large number of cases, and they failed to discover nerve-cells in the medulla of the supra-renal bodies, but upon their periphery, especially at the posterior surface, are "peri-capsular ganglia," which they declare are always implicated in Addison's disease, even when the semilunar ganglion and sympathetic nerves are not. On the other hand, Lewin (*Charité Annalen*, vol. x. p. 722) describes many axis cylinders in connection with ganglion cells in the adrenals.

I have been able to find only 81 published histories in which positive mention is made of the sympathetic system, and four of these may be regarded as incomplete, because no note is made of microscopic examination. Of the remaining 77 cases, 60 presented decided lesions of the sympathetic nerves or ganglia. Among the 30 cases most recently examined 27 had such lesions. This is certainly a very striking fact, taken in connection with the analysis of the symptoms of Addison's disease above given, in which I have attempted to show the possibility of the direct cause being an irritation proceeding from the abdominal sympathetic system. Are we not in a position to adopt the following

CONCLUSIONS.

First. That Addison's disease is a condition arising from and dependent upon irritation of the abdominal sympathetic nerves through lesions of themselves, their ganglia, or diseased supra-renal capsules.

Second. In the great majority of instances (fully 80 per cent.) the disease originates as a secondary or primary tuberculosis in the adrenals, and the sympathetic system is either involved by extension of pathological processes, or is functionally disturbed and irritated through the intimate anatomical connection existing between the adrenals and the relatively large number of nerves which they contain.

Third. Actual lesion of the sympathetic system, while far more common than heretofore supposed, is not necessary to produce the varied symptomatic phenomena of the disease. Functional disorder, through irritation conveyed from the adrenals, may sometimes cause all the symptoms—just as in chorea and in many of the conditions of aggravated hysteria, and other functional nervous disorders, we are often unable to find definite lesions.

Fourth. In a certain proportion of cases (not over 20 per cent.) the adrenals are affected by some other lesions than those of tuberculosis, or else they remain normal (in 12 per cent.) and the sympathetic nerves and ganglia are alone diseased.

I am aware that the objection may be raised that excessive pigmentation and even more extensive alterations are not infrequently found in the sympathetic ganglia, giving rise to no symptoms whatever (as in Cas XXVI. above reported), and also that there is a tendency of late among physiologists to assign less independence and less functional importance to the sympathetic nerve system. In Addison's disease there are but three reasonable hypotheses to account for the symptoms, namely, that it is a blood disease; that it is due to adrenal toxins; or, that it is due to sympathetic irritation, either functional or organic. The latter hypothesis, while perhaps not wholly satisfactory, appears to be supported by much weightier evidence than either of the others.

While these views are not new (*vide* Greenhow "On Addison's Disease," Croonian Lectures for 1875), by many they have not been finally adopted, because experimental and statistical data have been very slowly accumulated; and it has been my aim, by experiment and by analysis of all recorded cases, to place on a somewhat firmer basis the belief that Addison's disease is dependent upon lesion or irritation of the abdominal sympathetic nervous system.

THE BACILLUS PYOCYANEUS PERICARDITIDIS.¹

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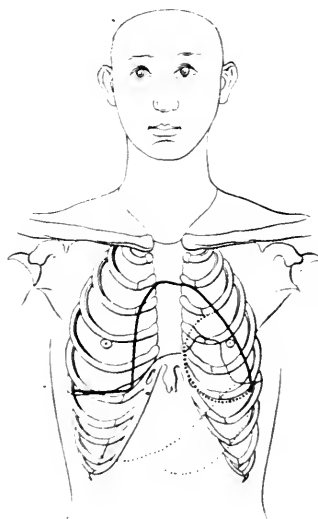
MUCH attention has been given of late years to the effects of the cultures, and their products, of Gessard's *B. pyocyaneus*, especially in anthrax. At various times authors have announced the isolation of bacteria very closely resembling this, but the only one that seems to have gained a permanent place in literature is the *B. pyocyaneus* β of

¹ Presented at the annual meeting of the Association of American Physicians, May, 1893.

P. Ernst, described by him a number of years ago. The differences, as given, are not marked, and Gessard is not inclined to acknowledge that they are due to more than temporary conditions, which appears the more justifiable, for the reason that these differences are largely simple variations in degree and intensity of color-production. It is not only upon differences in degree of color-production that the separation of the organism described in this paper depends, but upon differences of size as well, and the position taken appears to be justifiable because these differences have been found to be constant through a long series of cultures and controls.

The material from which the bacillus was originally obtained was placed in my hands by Drs. Councilman and Whitney, and came from a case in the service of Dr. F. C. Shattuck (at the Massachusetts General Hospital—"having been sent into the house from my service in the O. P. D."), to whose courtesy I am indebted for the following notes from the records.

October 26, 1892. J. E. H., aged forty-seven years, male, laborer, Demerara. No family history. Denies venereal disease. Pneumonia eight years ago. Malaria three years ago, with no periodicity. Signs of effusion about the heart, as per diagram, showing dull area to right



Oct. 27, 1892. Line of effusion. Systolic murmur within broken lines.

of sternum and included in heavy black line. To the right of the sternum was heard a to-and-fro friction murmur, high pitched and well marked. Respiratory murmur not heard over the dull area. Fibrillary twitching of the left pectoralis major. Cardiac sounds more and more muffled as the apex was approached.

November 18. Examination of lungs absolutely negative. Some cough at night with no expectoration.

19th. Pericardium tapped in fifth interspace just inside the line of flatness. About three-quarters of a quart removed and sent to Dr. Whitney for examination. Reasons for tapping: 1st. Increasing and disproportionate rapidity of respiration as compared with the pulse and temperature curves. 2d. Increasing loss of flesh and strength. 3d. Non-absorption of fluid in pericardium. 4th. Sudden attack of weak heart and embarrassed respiration.

26th. Tapped again. Some of fluid sent to Dr. Councilman, who reports plenty of tubercle bacilli and a new bacillus which liquefies gelatin.

December 17. Tapped a third time; one quart and one gill removed.

March 5. Tapped in sixth space half an inch outside of nipple, and a pint of yellow turbid fluid obtained.

12th. Eloped (and could not be traced).

As will be seen from these brief extracts, the case is one of extreme interest from a clinical point of view. It will be reported at length by Dr. Shattuck in connection with others. The part of it that should be spoken of here concerns only the gross appearances of the fluid removed at the various tapings, and the micro-organisms it contained.

The results of the last tapping I did not see. Those of November 26th and December 17th were a fluid, clear and amber-colored, faintly alkaline, and depositing a slight sediment only after standing. There was no odor, but a very large per cent. of albumin, the fluid coagulating very readily by heat, and when sterilized forming an apparently very favorable medium for the development of the bacillus found in it.

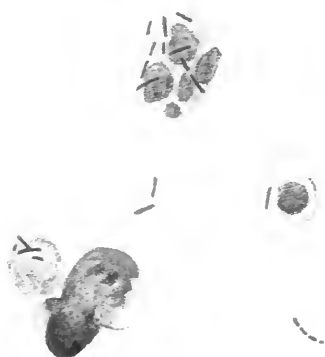
The microscopic examination by Dr. Councilman showed a number of the bacilli of tuberculosis and a second bacillus whose arrangement in the cells of the fluid attracted his attention, because of its unusual character. (See Plate.)

At my request a portion of the fluid was given to me for bacteriological analysis. Plate cultures in gelatin, and needle cultures in blood serum showed the presence of no other organism than one corresponding in its appearance, under the microscope, to that seen in the original fluid. Such an examination was made a second time of the fluid removed upon December 17th, with the same results. From these cultures, a long series of tests have been made upon a large number of different media, and under different conditions of temperature.

Every step in the investigation has been checked by and compared with cultures of the bacillus pyocyaneus derived from the following sources:

1. My own laboratory culture, which came originally from the Hygienic Institute, in Berlin, and has been under constant cultivation.
2. The laboratory of Johns Hopkins University; sent to me by Dr. Welch, he being not quite certain of the origin of the culture.

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Cover-glass preparation of pericardial fluid, stained by the Koch-Ehrlich method. The red rods are bacilli of tuberculosis. The blue rods are the bacillus pyocyaneus pericarditidis. (Comp. oc. 12. Apochrom. obj. 1.30. Camera lucida.)



3. The laboratory of the College of Physicians and Surgeons; sent to me by Dr. Cheesman, at Dr. Prudden's request, and coming originally from Prague.

4. The Army Medical Museum; given to me by Dr. Gray, and of uncertain origin.

Inasmuch as cultures from all these sources substantially agreed in gross appearances and under the microscope, minor variations in rapidity of growth and intensity of color-production being left out of account (for these were more in one at one time and in another at another), and at the same time, inasmuch as they all differed in the same way and under the same conditions from this new bacillus, the conclusion is irresistible that the organism is in reality an undescribed variety, and differs from the bacillus pyocyaneus by well-marked and constant characteristics. The results of the culture experiments have been tabulated for convenience sake, and the description of the *B. pyocyaneus* of Gessard and the *B. pyocyaneus* β of P. Ernst are added for ease of comparison. These are the only two organisms with which this *B. pyocyaneus pericarditidis* is in the least likely to be confounded.

BACILLUS PYOCYANEUS PERICARDITIDIS.

ORIGIN. Pericardial fluid, containing also bacilli of tuberculosis.

FORM AND ARRANGEMENT. Small straight bacilli, with rounded ends, three or four times as long as broad, and on most media slightly larger than the *B. pyocyaneus* of Gessard, occurring within the cells in the original fluid, and sometimes showing two or three end to end, but never observed in long chains.

MOTILITY. Actively motile in hanging-drop culture. No cilia or flagella have been demonstrated.

GROWTH. Gelatin: Plates.—Colonies appear at the end of 36–48 hours, as fine white points in interior, and upon the surface of the medium; edges are sharply defined; soon there appears a circular zone of liquefaction, finally passing through the stratum of the medium with the colony at the bottom. Under a low power the centre of the colony may be of a brownish color. On the second day a greenish tinge may be seen about the individual colonies on the surface which spreads through the entire medium. The plates may always be distinguished from those of the *B. pyocyaneus* of Gessard by the *bluish-green* when contrasted with the yellowish-green color of this latter.

Gelatin: Needle cultures.—At end of 24 hours a small saucer-shaped depression of liquefaction at upper end of needle track, which gradually spreads and deepens until the liquefaction extends straight across the tube and about half-way down the needle track. A bluish-green fluorescence appears about the liquefied portion at the very upper part of the gelatin, later changing into a yellowish-green. The colony is deposited as a yellowish heavy sediment at the bottom of the liquefied portion, the upper part of which is clear. A small whitish growth occurs along the remainder of the needle track. Old cultures, in which a certain amount of evaporation has occurred, assume a very dark greenish-black color.

Agar-agar.—Along the needle track appears a *flat*, dry colony of a dirty grayish-white color spreading out upon each side of the needle track and growing, at first, upon the surface of the water of condensation, later depositing a white sediment at the bottom. From the first there may be detected, by reflected light, a metallic lustre on the surface of the colony in places,

which metallic sheen later spreads over the whole colony and furnishes a marked differentiating point. In addition to this, within 24–48 hours at 37° C., there appears a green fluorescence throughout the whole of the medium, which increases slowly to a marked *bluish-green* color, and never assumes the nut-brown of the *B. pyocyaneus* of Gessard upon the same medium. The colony is not especially viscid.

Potato.—There appears a reddish-brown colony along the needle track, elevated and moist, confined to the line of the needle. Presents no change of color upon touching with needle, but certain specimens (as do some of the *B. pyocyaneus*) develop later a heavy green color extending over the whole surface of the potato, which later changes almost to black.

Bouillon.—Twenty-four hours at 37° C. gives a growth, especially on the surface, which is a wrinkled scum; no cloudiness of the bouillon, and a very faint greenish fluorescence 1 cm. below surface. At this time differs from the *B. pyocyaneus* of Gessard, in that the latter shows cloudiness of the medium all through. Later the same cloudiness appears in bouillon cultures of this new bacillus, together with a whitish sediment deposited at the bottom of the tube, and then the cultures are indistinguishable from each other. Same changes, but slower, occur at room temperature.

Peptone.—1, 3.5, and 6 per cent. solution. Twenty-four hours at 37° C. gives faint bluish tinge at upper edge of medium with very faint cloudiness; later (in one to two weeks) there forms a marked scum upon surface that is difficult to break up by shaking, and the whole medium assumes a grass-green color of more or less intensity and not seen on other similar bacilli. The shape and size of the organism, under the microscope, differs very markedly in this medium from any other bacilli examined. Same changes to be seen at room temperature, but more slowly.

Egg-Albumin: Plain.—Twenty-four hours at 37° C., yellowish-white, very profuse growth all along the needle track; yellowish-green spreading out from it almost to sides of tube, and in the condensation water as well. The growth has no especial distinguishing characteristics. Irregular liquefaction occurs, but the growth at no time differs in any marked way from other varieties of the *B. pyocyaneus*.

Blood-serum.—Twenty-four hours at 37° C. shows flat, moist colony with bluish-green fluorescence in its neighborhood. Liquefaction begins early and goes on slowly until complete in from one to two weeks, with an increasing intensity of color which becomes markedly blue, and eventually almost black.

Milk.—Behaves as do the other bacteria.

BEHAVIOR TO TEMPERATURE. Grows at 15–25° C., slowly; much more freely at 35–38° C., when it produces the color more quickly.

RAPIDITY OF GROWTH. Moderate.

SPORE-PRODUCTION. Not observed.

NEED OF AIR. Does not grow under mica. Facultatively anaërobic, but does not produce color except with free access of oxygen.

GAS-PRODUCTION. Produces faint foul odor.

BEHAVIOR TO GELATIN. Liquefies gelatin slowly.

COLOR-PRODUCTION. Produces a bluish-green color which in old cultures changes almost to a black. Upon the addition of acids (both vegetable and mineral) to cultures the color changes to red, and upon the addition of alkalis a bright grass-green appears. This reaction is best seen in bouillon and gelatin cultures, but occurs in other media as well, notably blood-serum.

BEHAVIOR TO ANILINE DYES. Stains easily and well with any of the aniline dyes usually employed, and by Gram's method.

MICROSCOPIC APPEARANCES IN DIFFERENT MEDIA. Under the microscope its general appearance on various media is of a rod larger than the *B. pyocyaneus*. In peptone cultures this difference is very marked. In this case, the *B. pyocyaneus* tested appeared as very short oval bacilli, almost like micrococci, while the new bacillus showed as a long fine rod, from four to six times as long as broad, about one-half the diameter of a red blood-corpusele, and arranged sometimes two or three end to end. These same

cultures transferred to gelatin became indistinguishable from each other in size.

PATHOGENESIS. Injections of small quantities (0.5 cm.) of a bouillon culture twenty-four hours old into the abdominal cavity of rabbits and guinea-pigs, killed 50 per cent. in from twenty-four to thirty-six hours. Autopsy showed general congestion of abdominal viscera, slight effusion into the peritoneal cavity, and cover-glass preparations and cultures showed the bacilli in the effusion in the abdominal cavity, as well as in the blood from the heart and various organs.

BACILLUS PYOCYANEUS. (GESSARD.)

ORIGIN. In "green" pus. Really the green color only appears after exposure to oxygen, so that the pus itself is never green as a result of growth of the organism.

SHAPE AND ARRANGEMENT. Short fine rods; often can be confounded with cocci.

MOTILITY. Actively motile.

GROWTH. Gelatin: Plates.—After two or three days the entire plate has taken on a clear green color (grass-green), the surface colonies liquefying the gelatin in a funnel shape. Under a low power the deeper colonies appear round and somewhat yellowish, with clear, strongly refracting granular edges.

Needle cultures.—After twenty-four hours the upper surface of the gelatin is liquefied in a funnel-shaped depression with fluorescent coloring (grass-green) of the upper surface. The liquefaction later extends straight across above the solid portion to the sides of the tube, and the whole gelatin takes on a beautiful fluorescence.

Agar-agar.—Moist greenish-white layer along the needle track and spreading out on each side, and the whole agar becomes colored with a diffuse, beautiful fluorescence (grass-green), which later turns to a nut-brown color.

Potato.—Dry nut-brown elevated colony along the needle track. With ammonia it takes on a green, with acids a red color.

Milk.—Produces a yellowish-gray layer at upper part; produces casein, and peptonizes it with help of ammonia.

BEHAVIOR TO TEMPERATURE. Grows well at summer temperature.

RAPIDITY OF GROWTH. Grows rapidly.

SPORE-PRODUCTION. Not observed.

NEED OF AIR. Will not grow under mica plates.

GAS-PRODUCTION. Not observed.

BEHAVIOR TO GELATIN. Liquefying.

BEHAVIOR TO ANILINE DYES. Produces blue pigment, pyocyanin. Stains easily with ordinary aniline dyes and by Gram.

PATHOGENESIS. Guinea-pigs inoculated in abdominal cavity are killed (Koch). Rabbits inoculated in blood-current live.

BACILLUS PYOCYANEUS β . (P. ERNST.)

Zeit. f. Hyg., Bd. ii. S. 36, ii.

ORIGIN. In the pus of gray-colored dressings.

FORM AND ARRANGEMENT. Small, very slender rods, not producing chains, but only two or three together at the most, probably possessed of cilia.

MOTILITY. Actively motile.

GROWTH. Gelatin: Plates.—Colonies never sharply defined, but with delicate radiating threads, which are always visible, until by liquefying in circular form the colony sinks to the bottom in an irregular mass. The neighboring portion of the medium is colored green.

Needle cultures.—In the shape of, at first, a round and soon a pointed, deeply widening champagne-glass shaped liquefaction with a slowly appearing green coloring of the medium.

Agar-agar.—As a greenish-white but dry layer along needle track, with green coloring of the agar.

Potato.—From a fawn to nut-brown dry colony, which turns gray when touched with the platinum needle. The "chameleon" phenomenon. Different from *B. pyocyaneus* *a*.

Bouillon.—A thin spider's-web-like growth on surface, which, by shaking, easily collects into skeins and sinks with difficulty. The upper part of the bouillon is colored green.

Milk.—Green color at upper surface; rapid coagulation and energetic peptonizing of the casein.

BEHAVIOR TO TEMPERATURE. Grows at 15–25° C., but luxuriantly at 35–40° C., when it produces the green color more quickly.

RAPIDITY OF GROWTH. Grows with moderate rapidity.

SPORE-PRODUCTION. Not observed.

NEED OF AIR. Strongly *aërobic*.

BEHAVIOR TO GELATIN. Gelatin is rapidly liquefied and turned into a fluid as thin as water.

COLOR-PRODUCTION. Produces a yellowish-brown color, which very easily changes by oxidation into a dark-green. It is sufficient to shake the cultures, thus bringing in the oxygen of the air, to produce a dark-gray color. Old cultures turn a strong black-brown.

PATHOGENESIS. Not known.

SUMMARY.

The essential differences between this organism and those with which it has been possible to compare it are therefore as follows:

I. *Macroscopic*. 1. The bluish-green tinge of the gelatin in plate culture, as seen by reflected light, as distinguished from the yellowish-green tinge of the others.

2. The dryness and metallic lustre of fresh colonies and the bluish-green color, by reflected light, of old cultures upon agar-agar, as distinguished from the moist elevated fresh colonies, and nut-brown color, by reflected light, of old colonies of the others.

3. The greenish color of the colonies in peptone solutions of varying strength as distinguished from the bluish color of the other bacteria tested with it.

4. The very much greater rapidity and intensity of the reaction of gelatin and bouillon cultures to acids (red color) and alkalies (grass-green).

II. *Microscopic*. The variations in its appearance under the microscope.

1. From gelatin, indistinguishable.

2. From peptone, long, slender rods, as contrasted with short oval ones,

3. On other nutrient media, its general average as a larger rod, which can be made out by comparative examination, but is hardly subject to measurement. It can be seen, however, in preparations from egg-albumin, bouillon, blood-serum and potato. Only upon gelatin and agar is there no appreciable difference.

It appears, therefore, justifiable to conclude that we are dealing with a distinct variety of the bacillus pyocyaneus, and that Gessard's conclusion that there is but one is unfounded.

FINAL RESULTS IN TUBERCULAR OSTITIS OF THE KNEE IN CHILDREN—COMMONLY KNOWN AS "WHITE SWELLING."

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FOR THE RUPTURED AND CRIPPLED, NEW YORK; ORTHOPEDIC SURGEON TO THE
NURSERY AND CHILD'S HOSPITAL.

EARLY in the spring of 1890 I began this investigation, and from that time to the present the bulk of the work has been done by Dr. P. H. Fitzhugh, house surgeon to the Hospital for the Ruptured and Crippled. We succeeded in getting the names of 499 patients who have applied for treatment at the Hospital for the Ruptured and Crippled since 1868, or who have applied at my clinic in the New York Polyclinic since 1882, or at my office since 1884. None have been included in this list who came under treatment since November 14, 1887. An exception might be made of the few who have applied for the correction of deformity or for the relief of an old sprain of the disabled knee. A few of this number are at present under observation, but are not receiving any active treatment. Perhaps many others might have been included in this list but for the lack of uniformity in nomenclature during the early days of my hospital life. For instance, the diagnosis of synovitis or peri-arthritis was made when the cases subsequently proved to be ostitis.

Starting, then, with this number, we aimed to make a personal examination of every case included in this analysis. In the Orthopædic Section of the last International Congress in Berlin, in 1890, I reported progress, but the report was handed to one of the secretaries, and I have up to the present time heard nothing of what disposition was made of my paper. The investigations have been continued with greater zeal, and up to January 4, 1892, we have secured final notes on 300 cases, which is the number on which the paper presented is based. My chief regret is my inability to tell how interesting and how instructive this investigation has proven, not only to Dr. Fitzhugh and myself, but to my associates in the hospital, for the past eighteen months. A large number of patients thus traced have borne willing testimony to the further relief to themselves by reason of this investigation.

DEFINITION.—I find it necessary, before proceeding further with this analysis, to define just what is understood by tubercular ostitis of the knee. Long before Koch discovered the bacillus of tuberculosis it was known that the lesion of common tumor albus, or white swelling, was most active in the ends of the bones forming the knee-joint, and, in quest of a better nomenclature, we spoke quite confidently of an ostitis

of the knee. Since the discovery of the bacillus, and since its absolute demonstration as a potent factor in the etiology as well as pathology of the affection under consideration, the term *scrofulous* or *strumous*, as applied to this disease, has been pretty well abandoned. Our definition, then, would be a tuberculous inflammation of the lower epiphysis of the femur, or the upper epiphysis of the tibia, or both, primarily, and a chronic inflammation by contiguity of the immediate joint structures.

CLINICAL FEATURES.—A child who is usually regarded as the frail member of the family begins to favor the knee by an almost imperceptible limp, or cries out with pain if the limb be moved in the usual way, and the parent immediately thinks of a fall or a sprain of some kind that has occurred while at play. A pretty careful home examination is made, and nothing definite is discovered. Next day or the day following the lameness is not so pronounced, or, at least, the parents think so, the wish being father to the thought, and the child goes about his play as usual. A few days, or sometimes a few weeks, subsequently it is found that the contour of the knee is altered a little, that the child is really more lame, and that more care is required in handling the limb. Then a physician is consulted, the joint functions are tested in a cursory manner, his eye detects the difference in appearance between the two joints superficially, and the case is regarded as either a sprain or a subacute rheumatic attack. If the former, the opinion is expressed that the child has sustained a fall or an injury of some kind. An investigation is instituted, and the opinion is confirmed. All children fall while at play at some time or other, and a severe fall is not necessary to the production of an injury of this kind. The mother or the nurse in this way becomes, by negligence, the cause of the child's disability. On the other hand, if the diagnosis of subacute rheumatism is made, then the father or mother remembers some twinges about the shoulders or some other part of the body that they have experienced, and the professional opinion is here confirmed. Whether the affection be diagnosed as a sprain or as rheumatism, it is suggested that a few days, or a week or two at least, will decide the matter, and thus the disease makes headway. The lameness persists, the joint is vulnerable, and trauma now begins to play an important part. If the joint functions are fully tested at this time, there will be found reflex spasm on complete extension of the limb, and reflex spasm as the limit of complete flexion is approached. The only satisfactory way of testing the functions of the joint is to test the functions of the correspondingly sound joint, and both limbs should be bare of clothing. One who makes his test in this way will discover also a change in contour. The normal depressions on either side of the patella will be shallower than those on the well side; the ligamentum patellæ itself will show some expansion; the condyles and the head of

the tibia, if pressed upon, will be found tender; there may be a little synovial distention, as shown by palpation and flexion of the limb; there will be found in the majority of instances atrophy of the thigh and of the calf, with increase of the knee measurements; furthermore, by palpation, one or two points of extra heat will be detected. It is in this early stage, though, that these signs are apt to be overlooked, not because the physician is incompetent to detect, or even incompetent to interpret, but they are overlooked because he fails to make an examination.

The symptoms and signs already enumerated belong to what is known as the first stage, that is, the stage preceding deformity. The presence of a distended synovial sac does not always take the disease beyond the first stage, because the inflammatory process in the end of the bone may extend by continuity and contiguity to the synovial sac, under the influence of a trauma, and this temporary synovitis may be but the expression of an exacerbation. I have many photographs of the knee in the first stage, but it is difficult to bring out the points in a large drawing, and hence I have made no effort to present them, but have endeavored to make my description sufficiently graphic to convey my meaning with precision.

Under the influence of impaired nutrition, under the influence of occasional severe traumatism, and under the influence of the trauma of use, which is almost continuous when the child is walking or playing, the disease advances gradually into what is known as the second stage, or the stage of deformity. In a few instances this stage is never reached, because the original blow has been a light one and the focus of disease has not spread, but has been surrounded by a certain amount of bone sclerosis, thus protecting the patient against further disability. It is not always necessary to have multiple foci in the neighborhood of the joint, any more than it is to have multiple foci in the lung. The dosage of disease is a personal factor that ought not to be overlooked. Among pathologists the dosage of bacilli is always an important factor, not only in the selection of therapeutic measures, but in prognosis. On more than one occasion I have asked the distinguished President of this Academy about a given patient, whom he had sent from home in search of health, and got this reply: "Oh, he is doing very well; he was not struck very hard." The expression is certainly a good one, and I find myself calling it up many times in giving a prognosis about a given case of tubercular ostitis of the knee. This second stage of deformity is attended usually with varying degrees of pain. The muscular spasm is greater; night cries are more frequent; the lameness amounts frequently to absolute inability to walk. It is in this stage that abscess appears. The structures in immediate contact with the knee or adjoining bones are distended, and the suffering becomes at times intense. This in turn

impairs still more the general health. Fomentations and blisters and plasters fail to give relief. The normal contour of the joint is changed into one wherein the skin is glossy, veins enlarged, superficial parts very tender, surface heat increased, and wherein the joint is fixed, any passive motion causing great pain. In this stage, too, we have exacerbations induced by trauma, or impaired health, or both. These exacerbations last from three or four days to three or four weeks. In the intervals the patient walks about, but with the heel raised, toes and ball of foot only touching the floor, the knee-limp still more exaggerated, and assisted by a crutch or cane.

The third stage is generally known as the suppurative stage, and is attended with luxation or subluxation of the tibia and of the patella. The fixation of the limb from spasm of the muscles—which spasm has been caused by the effort on the part of Nature to protect the joint against trauma—is replaced by ankylosis. Destruction of bone takes place, the cicatrices form after sinuses or uclers, actual shortening of tissue takes place. Shortening of the limb is now manifest, and the persistence of suppuration oftentimes induces a septicæmia that baffles medical skill, or an amyloid degeneration of liver and kidneys, or, in some instances, a tubercular meningitis, though patients more frequently develop meningitis in the second stage. It is difficult to fix the limit to these different stages of the disease. Suffice it to say that the average duration of tubercular ostitis is from three and a half to four years. More time might with propriety be devoted to clinical features, but the surgical literature is sufficiently full. I did wish, however, on the present occasion to refresh your minds with the more salient points, in order that you might more fully appreciate the results which have been obtained by art as well as by Nature.

THE ANALYSIS IN DETAIL.

I. *Sex, Side, Age when Disease developed, and Involvement of Other Joints.*

A. *Sex.* For this heading the full number of cases to be traced can be employed, and we find 223 females and 276 males.

B. *Side.* There were 239 cases wherein the affected knee was the right, 235 wherein it was the left, and 25 wherein the side was not given.

C. *Age when disease developed.* Forty-seven patients developed the disease before the close of the second year of life; 64 between the second and third; 40 between the third and fourth; 46 between the fourth and fifth; 47 between the fifth and sixth; 33 between the sixth and seventh; 20 between the seventh and eighth; 27 between the eighth and ninth; 15 between the ninth and tenth; 12 between the tenth and twelfth; 20 between the twelfth and fifteenth; 7 between the fifteenth and twentieth; 5 between the twentieth and twenty-fifth; 3 between the twenty-fifth

and thirtieth; 1 at the age of forty-one; and in 112 cases the age was not ascertained.

Unfortunately these 112 cases must be left out of the count, and we have then 387 cases for this part of the analysis, namely, the age when disease developed. In 197 or nearly 51 per cent. the disease developed before they were five years of age; 142 or 36 per cent. between the ages of five and ten. We then have 339 patients or over 87 per cent. of the whole number, in whom the disease showed itself prior to the tenth year of life. In 39 cases or about 10 per cent. ostitis developed between their tenth and twentieth year, while still in the period of youth, and 9 or about 2 per cent. after they had passed the twentieth year of life.

D. *Involvement of other joints.* Much has been written about the involvement of other joints, and the fear is often expressed that the disease may break out elsewhere. Of 499 cases there were only 16, or 3 per cent., wherein other joints or bones were involved, so that the danger is not great. Of the 16, 8 had Pott's disease of the spine; 2, ostitis of the hip, or hip disease; 1, ostitis of the ankle, commonly known as caries of the ankle; 1, disease of the elbow; 1 case had a like disease of the wrist and shoulder; 2 had the affection in the other knee; and 1 extraordinary case had the following joints involved: the other knee, the elbow, and the shoulder.

Of 300 cases, 140 (46 per cent.) had abscess, 160 never had abscess, 40 have died; cause of death as follows: 6 of tubercular meningitis, 14 from exhaustion after prolonged suppuration, 3 from phthisis, 2 from dysentery, 2 from amyloid degeneration, 12 from intercurrent affections not connected with the disease, and 1 from shock following excision. It is fair to assume that 22 died *as a result of the disease*, causing exhaustion from suppuration, tubercular meningitis, and amyloid degeneration. This gives us a mortality of $7\frac{1}{3}$ per cent.

II. *Analysis with reference to Treatment.*

All the cases have been subjected to one of three kinds of treatment, which may be designated as follows:

1. The purely *expectant*, which means the treatment of symptoms with little reference to signs, little reference to correction or prevention of deformity; an effort to relieve exacerbations, and, during intervals, freedom from treatment; the irregular use of apparatus; frequent changes in apparatus, no special form being used sufficiently long to even test the efficiency of the same.

2. The *fixation* treatment. This means the continuous use of some form of apparatus, whether plastic or steel, some of which partially and some completely immobilize. Under this class may be named the posterior Knight brace, the plaster-of-Paris bandage, either solid or cut

down and trimmed up as a splint; and the various forms of extension apparatus in use.

3. The third is the *protective* treatment, which means immobilization of the joint until all acute signs have subsided and convalescence can be safely predicated; the use of an apparatus that prevents concussion or jar—in fact, trauma of any kind—whether in the shape of a perineal crutch or axillary crutches. I do not class under protection splints the ordinary extension apparatus, because the adhesive plasters with which traction is secured slip, and the skin and deeper tissues themselves move, so that jar or trauma is not prevented. Under the term *protective* may also be included *corrective*, which means the correction of deformity, either by apparatus, by manual force under an anæsthetic, or by incision. It so happens that we depend largely, in the protective treatment, on the Thomas knee splint. This, as you see, is simply a peroneal crutch with high shoe, or patten, for the sound foot. For this reason we have spoken of this as the Thomas method—after the late H. O. Thomas, of Liverpool. It is only fair to Mr. Thomas, and to those who advocate the protective treatment I have defined, to say that Mr. Thomas did not employ fixation apparatus in the sense employed by American surgeons. He was opposed to the use of plaster-of-Paris or any form of plastic dressing that prevented frequent inspection of the knee. It is true that his splint consisted of a posterior leather trough, on which the limb rested, and to which the knee was secured by means of a roller bandage. From what I saw of his treatment I am sure, however, that he aimed to protect the joint against trauma, and that he aimed to immobilize by means of his posterior trough in the splint and the roller bandage. So that the method, after all, can and should be known as the Thomas treatment.

It has been exceedingly difficult to draw a sharp line of distinction between the three methods already defined. Still, in a general way, we have sufficient data for the following figures: 71 cases are recorded as having been under the expectant treatment, with 3 deaths, 2 of which only were from the disease; 5 came to excision, 3 to amputation, and 60 remained with fair results. In 190 cases the fixation treatment was adopted throughout. Of this number there were 35 deaths, 20 of which were traceable to the disease itself (about 10 per cent.); 9 came to excision, 1 to amputation, and 145 remained with more or less fair results. Only 39 have been subjected to the protective, or Thomas, treatment. Two died from causes in no way connected with the disease itself; 37 remained with good results.

The results in the 60 cases under the expectant plan show that 23 had abscess (38 per cent.), 37 had no abscess. Of the 145 under the fixation plan, there were 63 with abscesses (43 per cent.), 82 without. Of the 37 under the protective plan, 19 (about 50 per cent.) had abscesses,

18 not. This shows a greater proportion of abscess cases among those treated by the protective plan, but it can be easily shown that the majority had abscess before the Thomas treatment was begun.

Analysis as regards motion. Among 23 suppurative cases—cases treated by the expectant plan—14 had motion, 9 were pretty firmly ankylosed. Among those without abscess (37 cases) 30 had motion and 7 were ankylosed.

Under the fixation plan (63 cases), where abscess had occurred, there was motion in 43 instances and ankylosis in 20. Among those without abscess (82 cases), 70 had motion, 12 had no motion.

By the protective plan, where abscess occurred (19 cases), 16 had motion and 3 were ankylosed. Where abscess did not occur (18 cases), all had motion, none were ankylosed.

A *résumé* now would be as follows: Of 60 cases under the expectant plan, 44 (or 60 per cent.) had motion, 16 had no motion. Under the fixation plan, in 145 cases, 113 (76 per cent.) had motion, 32 had no motion. Among those treated by the protective plan, in 37 cases, 34 (95 per cent.) had motion, 3 had no motion.

Briefly, then, this analysis shows that motion was obtained more frequently in those treated by the protection plan. The table will show the percentages, and no further reference will be made to that on this occasion.

Other tables show the amount of motion, and I will only say here that 16 of the cases where abscess occurred presented over 90° of motion, while in those where abscess did not occur 25 could be voluntarily moved over an arc of 90°.

Another table will show the intervals of time elapsing between the last observation and the beginning of the disease. There were, for instance, 6 cases where from twenty to thirty years had elapsed; 7 from fifteen to twenty; 22 from ten to fifteen, and so on.

Relapses. It is interesting to note that relapses are not very frequent. Reference to the tables shows that among the abscess cases only 4 relapses occurred in periods varying from seven to twenty years afterward. Among the non-abscess cases 6 relapsed. The question is often raised, Do not these patients require apparatus of some kind the remainder of their lives? This point has been investigated, and of the abscess cases only 14 (4½ per cent.) are wearing some sort of support; of those where abscess had not occurred, 22 (7 per cent.), making a total of 36 (12 per cent.) out of the 300.

Deformity. Of all the cases, both abscess and non-abscess, whether ankylosed or with motion, 150 presented subluxation of the tibia, against 48 where there was no subluxation. Only 2 of the whole number presented complete luxation. In 183 cases where the condition of the patella was observed, in 124 cases the patella was movable, in 59 there was no motion.

The position of the limb; or, rather, the limit of extension. Reference to my tables here shows that of 227 cases, only 15 got well with deformity at an angle under 135° , and 141 presented an angle of deformity of not less than 165° . This enabled them to walk with their limbs practically straight, and with scarcely an appreciable deformity. To go more into details, 71 could extend their limbs to an angle between 175° and 180° .

By comparing the different methods of treatment, it can be shown, without going into details, that the protective treatment gives the largest percentage of good results, so far as position is concerned, the fixation next, the expectant the smallest percentage.

The length of the condyles. Forty-eight cases have been analyzed with reference to epiphyseal lengthening. To this 48 I am at liberty to add 68 analyzed by Dr. John James Berry, at that time a member of my house staff, who published in the *Boston Medical and Surgical Journal*, many years ago, a paper on "The Growth of Bone in Knee-joint Disease, from Measurements of Ninety-two Cases." Taking, then, for our analysis 116 cases, we find the following:

In 6 cases	.	.	.	.	.	.	.	1 inch lengthening.
In 15 "	.	.	.	.	.	.	.	$\frac{3}{4}$ " "
In 34 "	.	.	.	.	.	.	.	$\frac{1}{2}$ " "
In 17 "	.	.	.	.	.	.	.	$\frac{1}{4}$ " "

Great care was taken, both by Dr. Berry and myself, in securing these measurements. The extreme end of the condyle was found on both sides, a mark made on the skin directly over the end of the condyle, and the two sides carefully compared. This gives us 62 per cent. of the whole number with increased length. A larger percentage of cases occurred among those treated by the protective method.

Among the cases that came to excision (14 in number), an analysis bearing on the deformity and shortening is as follows:

1 was held fixed at an angle of	.	.	.	.	.	.	.	120° .
1 " " "	.	.	.	.	.	.	.	150° .
1 " " "	.	.	.	.	.	.	.	160° .
6 were " " "	.	.	.	.	.	.	.	170° .
3 only " " "	.	.	.	.	.	.	.	180° . ¹
2 deformity not known.								

In 3 of these the deformity was less than 160° . As to shortening:

1 presented only	.	.	.	.	.	.	.	$\frac{1}{2}$ inch shortening.
1 " " "	.	.	.	.	.	.	.	$1\frac{1}{2}$ " "
2 " " "	.	.	.	.	.	.	.	2 " "
1 " " "	.	.	.	.	.	.	.	$2\frac{1}{2}$ " "
1 " " "	.	.	.	.	.	.	.	3 " "
1 " " "	.	.	.	.	.	.	.	$3\frac{1}{2}$ " "
2 " " "	.	.	.	.	.	.	.	4 " "
1 " " "	.	.	.	.	.	.	.	8 " "
4 not known.								

Five of these present still a high degree of sensitiveness over the patella.

¹ That is, perfectly straight.

TABLE I.—NON-ABSCESS CASES WITHOUT MOTION.

Number of years after inception at last observation.	Ankylosed.							Relapse.	Remaining under treatment.			
	105° to 115°	115° to 125°	125° to 135°	135° to 145°	145° to 160°	160° to 170°	170° to 180°		Support only.	Fix- ation.	P. P. and Thomas	
From 3 to 5 years	...	...	...	...	...	...	...	...	...	...	...
" 5 " 7 "	...	...	...	...	...	...	...	...	...	...	...
" 7 " 10 "	...	...	...	2	1	1	1	1	1	1	...	
" 10 " 15 "	...	1	1	2	1	2	...	...	1	...	...
" 15 " 20 "	1	...	...	1	...	...	...	...	...	...	...
" 20 " 30 "	...	...	1	...	1	3	...	...	...	...	...
Total . . .	1	1	2	5	3	6	1	1	2	1	...	
Treatment.								Total.	Sublux- ated.	Lux- ated.	Patella movable	Patella fixed.
Expectant . . .	1	...	2	2	...	2	...	7	7	...	...	7
Fixation . . .	...	1	...	3	3	4	1	12	10	...	...	12
P. P. and Thomas .	...	...	...	...	...	...	...	...	...	...	...	...

TABLE II.—NON-ABSCESS CASES WITH MOTION.

Number of years after inception at last observation.	Degree of extension.							Relapse.	Remaining under treatment.			
	115° to 125°	125° to 135°	135° to 145°	145° to 155°	155° to 165°	165° to 175°	175° to 180°		Support only.	Fix- ation.	P. P. and Thomas.	
From 3 to 5 years	1	...	6	15	...	...	2	4	
" 5 " 7 "	3	5	6	...	...	2	1	
" 7 " 10 "	3	6	5	5	8	1	1	4	1	
" 10 " 15 "	...	1	...	2	8	8	9	1	1	2	...	
" 15 " 20 "	...	2	2	2	1	5	7	2	1	4	...	
" 20 " 30 "	1	1	1	...	...	3	1	1	1	2	...	
Total . . .	1	4	6	10	17	32	46	5	4	16	6	
Same have following amount of motion.								Total.	Sublux- ated.	Lux- ated.	Patella movable	Patella fixed.
5° motion	...	1	1	2	...	3	3	10	4	1	3	6
5° to 10 "	...	3	1	...	3	6	3	16	11	1	11	3
10 " 15 "	1	2	1	4	3	11	8	...	6	1
15 " 25 "	1	4	1	5	2	13	12	...	12	...
25 " 35 "	2	3	5	4	14	11	...	9	2
35 " 45 "	1	...	...	2	2	5	1	...	3	...
45 " 60 "	1	3	1	5	5	...	5	...
60 " 75 "	1	...	1	1	4	2	1	10	9	...	9	...
75 " 90 "	3	3	3	9	4	...	8	...
Beyond 90 "	25	25	4	...	19	1
Treatment.								Total.	Sublux- ated.	Lux- ated.	Patella movable	Patella fixed.
Expectant . . .	1	1	1	3	12	8	4	30	...	...	...	...
Fixation	3	6	6	7	19	28	69	...	...	...	...
P. P. and Thomas	5	13	18	...	...	...	...

TABLE III.—ABSCESS CASES WITHOUT MOTION.

Number of years after inception at last observation.	Ankylosed at							Open sinuses.		Relapse.	Remain under treatm't.		
	105° to 115°	115° to 125°	125° to 135°	135° to 145°	145° to 160°	160° to 170°	170° to 180°	1 to 3	3 to 5		Support only.	Fix- ation.	P. P. and Thomas
From 3 to 5 years	...	...	...	1	1	2	...	1	...	...	...	1	...
" 5 " 7 "	...	...	1	...	1	2	...	...	...	...	...	...	...
" 7 " 10 "	1	1	2	2	2	1	1	1	...	...	...	1	...
" 10 " 15 "	1	...	1	2	...	2	...	...	1	1	...	...	...
" 15 " 20 "	...	...	1	1	1	1	...	...	...	...	...	...	...
" 20 " 30 "	...	1	...	2	1	...	...	...	...	...	1	...	...
Total . . .	2	2	5	8	6	8	1	2	1	1	1	2	0
Cicatrices.								Total.		Sublux- ated.	Lux- ated.	Patella movable	Patella fixed.
1 cicatrix	...	...	...	1	1	2	...	4	...	4	...	...	4
1 to 3 cicatrices	1	...	...	3	3	5	1	13	...	10	1	1	12
3 " 5 "	...	...	...	1	2	2	...	5	...	5	...	...	4
5 " 7 "	...	1	2	1	...	...	...	4	...	4	...	...	3
7 " 10 "	...	1	...	1	1	...	...	3	...	3	...	...	3
10 " 15 "	1	...	...	...	...	...	...	1	...	1	...	...	1
15 " 20 "	...	...	1	...	...	...	...	1	...	...	...	...	...
Treatment.													
Expectant . . .	1	1	...	2	4	1	...	9					
Fixation . . .	1	1	4	6	3	4	1	20					
P. P. and Thomas	...	...	...	...	...	...	...	3					

TABLE IV.—ABSCESS CASES WITH MOTION.

Number of years after inception at last observation.	Degree of extension.							Open sinuses.		Relapse.	Remain under treatm't.		
	115° to 125°	125° to 135°	135° to 145°	145° to 155°	155° to 165°	165° to 175°	175° to 180°	1 to 3	3 to 5		Support only.	Fix- ation.	Thomas.
From 3 to 5 years	...	...	...	1	2	3	4	1	...	...	...	2	1
" 5 " 7 "	...	...	...	...	2	2	4	...	...	...	...	1	1
" 7 " 10 "	...	...	1	1	5	6	8	2	...	1	...	2	3
" 10 " 15 "	1	1	1	2	2	9	6	1	1	1	...	3	...
" 15 " 20 "	...	1	1	1	2	2	...	...	...	1	...	3	...
" 20 " 30 "	...	...	...	2	1	2	1	...	...	...	2	1	...
Total . . .	1	2	3	7	14	24	23	4	1	3	2	12	5
Amount of motion.								Total.		Sublux- ated.	Lux- ated.	Patella movable	Patella fixed.
5° to 10° motion	...	...	1	3	2	2	1	9	...	7	...	4	4
10 " 15 "	...	...	1	1	1	5	2	10	...	8	...	6	2
15 " 25 "	...	...	1	2	3	3	1	10	...	8	...	5	1
25 " 35 "	1	1	...	...	3	1	1	7	...	5	...	2	5
35 " 45 "	...	...	...	1	4	2	1	8	...	7	...	5	1
45 " 60 "	...	...	...	1	2	2	...	5	...	3	...	5	1
60 " 75 "	...	1	...	...	1	1	...	3	...	3	...	4	...
75 " 90 "	...	...	...	...	...	3	2	5	...	3	...	5	...
Over 90 "	...	...	...	...	...	1	...	1	...	...	...	1	...
	...	...	...	...	...	2	14	16	...	3	...	13	...
Cicatrices.													
1 cicatrix	1	...	1	2	7	3	10	24					
1 to 3 cicatrices	...	1	2	2	4	7	8	24					
3 " 5 "	...	1	...	...	5	5	5	16					
5 " 7 "	...	...	...	2	...	2	1	5					
7 " 10 "	...	...	...	1	2	...	...	3					
10 " 15 "	...	...	...	...	...	1	...	1					
Treatment.													
Expectant . . .	1	...	1	2	3	5	2	14					
Fixation . . .	...	2	3	5	11	10	13	44					
P. P. and Thomas	...	...	...	...	3	4	9	16					

TABLE V.—THIRTY-NINE CASES ANALYZED AS TO MODE AND DURATION OF TREATMENT AND RESULT.

Compared as to Mode and Duration of Treatment.

Length of time treated.	Thomas and fixation.	Fixation.
Less than 3 years	8	8
" " 4 "	2	7
" " 5 " . . . . .	...	3
" " 7 " . . . . .	...	5
" " 9 " . . . . .	...	3
" " 11 " . . . . .	...	3
Total	10	29

Compared as to Mode of Treatment and Result.

Degree of motion.	Thomas and fixation.	Fixation.
Less than 10° . . . . .	...	1
Having 10	1	3
" 20 . . . . .	...	2
" 40 . . . . .	...	5
" 60 . . . . .	...	2
" 80 . . . . .	...	3
Over 80	9	13
Total	10	29

It has long since been established that the growth of bone is seriously interfered with by excision, and surgeons, as a rule, avoid operating on the knee-joint. The cases that I have presented lend additional weight to the argument against the operation. The appearance of sinuses, the infiltration and distortion of the limb, seem to demoralize the surgeon at times, and he feels that only an excision will save life.

The tables given are presented without comment further than sufficient to make them clear. It was my intention to supplement the paper by illustrations, but this would make it unusually long.

Table I. refers to the cases wherein no abscess occurred, and where ankylosis has resulted; II., the same class of cases with motion. Table III. relates to abscess cases without motion; IV., abscess cases with motion. Table V. is a comparative table, and may be of interest in fixing more definitely the facts obtained from the analysis above given.

PNEUMONIA OF DELAYED RESOLUTION AND FIBROID
PHTHISIS IN CHILDHOOD.

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IN Fagge's *Principles and Practice of Medicine* occurs the following passage :

"Addison¹ described certain rare and exceptional cases in which, after an illness of a few weeks, with all the evidences of consolidation present, the patient dies and the lung is found uniformly albuminized. 'The section is not soft, lacerable, and granular as in acute gray hepatization, but smooth, solid, and tough. The alveoli are full of fibrillated lymph, and the exudation cells may have begun to be granular and fatty. It is a condition of the lung very liable to break down, and thus constitute a case of rapid phthisis; and, on the other hand, it is a condition from which recovery may take place and the lung be completely restored.' Wilkes and Moxon,² after quoting this account, continue: 'That there is a chronic pneumonia of such a kind can scarcely be denied when it is remembered for how long a time all the signs of consolidation may endure, and then a complete restoration take place. We must, therefore, believe that there is a true chronic pneumonia whose origin is an ordinary inflammation and exudation into the alveoli, and whose appearance is best noted by the term uniform albuminous induration.' They add, however, that such chronic pneumonia may be of the lobular kind, and Addison himself said that this condition may be limited to one or a few lobules only; so that it may, perhaps, be doubted whether this 'least frequent of the permanent pneumonic indurations of the lung' is not, after all, an unusually extensive catarrhal pneumonia."

This communication is to illustrate the fact that similar retarded resolution may be met in childhood, and to narrate cases which are examples of this condition. Further, I shall depict the cirrhotic lung of simple inflammatory type, and its mode of formation from a preceding pneumonia.

According to Fagge, Dürr has recorded, in a volume published by Jürgensen at Tübingen, two cases which occurred in very young children, but in each of which the primary attack appeared to be one of lobar, not catarrhal, pneumonia. *Apropos* of this he says: "Probably, however, the pneumonia which leads to cirrhosis, instead of being lobar is as a rule lobular and catarrhal, secondary to measles or whooping-cough."

¹ Guy's Hospital Reports, 1843, and in the volume of his collected papers published by the New Sydenham Society, p. 27.

² Pathological Anatomy, p. 338.

Lobar broncho-pneumonia, however, is very frequent in childhood; moreover, I have already pointed out that the histological difference between croupous and broncho-pneumonia¹ is merely one of degree, that it is not by any means well marked or striking, and that no difference of kind exists in the sense that in one case we have to do exclusively with a croupous inflammation, and in the other with a catarrhal. Nor can such an origin be denied on the ground, held by some, that in catarrhal pneumonia alone the tubes and areolar tissue are invaded with leucocytes. Such an invasion does occur in croupous pneumonia, and the inflammatory condition in children is not by any means necessarily limited to the alveoli.

In pneumonia, when the temperature has fallen to normal, the usual course is for the lung mischief to clear up. Clearance mostly takes about a week, occasionally a little longer, sometimes a day or two, but it may be more prolonged or apparently remain in abeyance.

Resolution is attended by reflux crepitation of moderate-sized râles, more or less marked, which may be detected on the day of the crisis. Sometimes fine crepitations are heard. Again, crepitations may never be present, the consolidation disappearing noiselessly. This, omitting pleuritic effusions, is the usual course of events; but resolution may be so retarded as to raise a suspicion of tuberculosis.

In the first place, it is necessary to realize the great frequency of apical pneumonia in childhood, or a pneumonia invading the root and reaching to the upper lobe and the apex of the lower lobe, and further, to be fully alive to the fact that resolution occasionally occurs tardily, and that sometimes the consolidated mass remains in a state of inertia for days, weeks, or even months. Such a sequence is not sufficiently recognized, and it is in such cases as these that the suspicion previously mentioned may crop up, and a hasty and unfavorable prognosis hazarded. It is to just such cases—like those I am about to relate—that I wish to draw attention, and to impress the desirability of exercising caution before condemning the lung—and, with the lung, the patient.

Before proceeding further, the following clinical illustration may be read with interest:

CASE I.—Charles R., aged two years and nine months, was found to have a consolidated left apex on September 20. His temperature was 98° F. He had suffered from cough for a month, and the last week had been much worse.

On the 22d instant it was discovered to be clearing a little. On October 8th there was still consolidation of the lung, with dulness and tubular breathing. The child was much better in general health. On the 11th the lung condition was much improved. Dulness had disap-

¹ "Croupous and Broncho-pneumonia in Children: their Histological Identity." By George Carpenter and W. H. Syers, M.A., M.D. Cantab., M.R.C.P. Practitioner, vol. xlvii., No. 6.

peared, though the note was not good. There was no tubular breathing. On November 4th he was discharged quite well.

CASE II.—William S., aged twelve months, attended on April 28th with consolidation of the right, upper, and middle lobes. His temperature was 98.4° F. He had suffered from a cough, and had been wasting for five weeks. The child was rickety, and presented an enlargement of the liver and spleen.

In spite of the extreme consolidation, he did not look at all ill. On May 5th there was no change in the physical signs. Scott's ointment was applied over the consolidated area.

On June 2d he was stated to be "getting on beautifully," but that he suffered from a most troublesome cough. He did not make any further attendance.

CASE III.—Elizabeth W., aged four years, was seen on January 12th, and found to have a consolidated right apex. Fourteen days previously had taken cold. Her temperature was 101.8° F., and ran up and down until the 28th, when the oscillations became less, up to the 31st, and from that date the temperature varied between 98° F. and 99° F. for the most part, always falling short of 100° F., until she was lost sight of, on March 21st.

On January 27th there was nowhere absolute dulness, but abundant coarse crepitations all over the right chest. Bronchial breathing was heard in the axilla. By February 4th the râles were not so abundant, but otherwise the physical signs were as before. On February 12th she was found to be gaining weight. On the 19th she was taking her food well and making flesh. Her right chest was nearly as resonant as the left. Deficient inspiration and bronchial expiration were detected, accompanied by a few râles only, and those chiefly in front.

She was much better on the 25th and still gaining flesh. There was no actual dulness, but deficient resonance with distant bronchial breathing over the right scapular spine and above the right nipple. Fine, moist râles were detected over the right base up to the angle of the scapula. March 27th she was sent to St. Agatha's Home, Beckenham.

CASE IV.—Annie G., aged three years, was seen on December 16th. There was a family history of rheumatism and phthisis. Her illness commenced six weeks previously, and she had been gradually getting worse. There were tubular breathing, dulness, and bronchophony of the left apex. The temperature was then a trifle raised, but fell on the 19th, and remained down all through except during a slight attack of bronchitis and also one of tonsillitis. On December 28th, the resonance, although still diminished very decidedly, was more than before. It was tympanitic where previously the dulness was nearly absolute. Posteriorly, there was very fair respiration in the suprascapular fossa. A note on March 13th recorded that she had gained weight since her admission, but the physical signs in the chest, although varying somewhat from time to time, had not materially changed. There was then almost absolute dulness beneath the left clavicle, and hardly anything to be heard. Posteriorly, there was more resonance than formerly, but very little breathing was detected. The bronchial breathing was much less than when first seen. The question of a localized collection of fluid suggested itself, but she seemed to have so little the matter with her that it was not thought worth while to explore. She was discharged on March 16th. Her mother, who subsequently attended as an out-patient, informed me

that the child remained perfectly well until she caught measles sixteen months later. She had a trifling cough, but never brought up phlegm or blood. Her appetite was excellent, and she was in good condition. Toward the end the child had diarrhœa, some ten or twelve motions a day, and convulsions which lasted two days, and she died some three weeks after the onset of measles.

CASE V.—Elizabeth S., aged six months, a congenital syphilitic, was brought on March 31st. Consolidation of the right upper, middle, and part of the lower lobe was found.

On April 3d, reported to have vomited "a deal of phlegm" the day previous. Her temperature was 99.8° F. Tubular breathing was now present at the extreme base. On April 17th she was "a deal better." On May 1st nettlerash made its appearance. As the physical signs remained unaltered, iodide of potassium ointment was ordered for the chest. By June 5th the chest was unaltered and the "cough was very bad." In spite of this, the infant was perfectly lively and bright. On June 30th there was still dullness over the right apex in front and behind, but not extending so far down as before. Tubular breathing and consonating râles were heard over the dull area. Dulness, tubular breathing, and consonating râles were detected over the upper lobe on August 18th. September 8th, the temperature was 101° F., the cause not being apparent. She was gaining flesh. I then took her into the hospital for closer observation, and she was an inmate until the 14th. Her temperature remained subnormal during the whole of this period. On September 18th she was obviously rickety; she looked well enough, however, and was quite bright and lively. The spleen was enlarged a trifle. On October 9th she was much better, but still suffered from urticaria. Her temperature was subnormal, and as far as the mother could judge, she was "in perfect health and getting fatter." The chest condition remained *in statu quo*. An ophthalmoscopic examination gave negative evidence. On November 24 I found a note by my former clinical assistant, Dr. W. H. Millar, to the effect that the right apex was a trifle dull and some crepitations were detected over it. All over the right lung the air entered badly in comparison with the left, and the breath sounds were weak. Extra puerile breath sounds were detected on the left. She was not brought again.

Recently I wrote to the patient's mother and received the following reply: "Our baby died on the 1st of January with convulsions, through being accidentally scalded on the legs."

CASE VI.—Jessie S., aged five years and six months, was brought with a consolidated left apex and a temperature of 101.2° F., September 26th. October 3d the temperature was found normal and the physical signs were as before. October 10th she was progressing favorably, had a better appetite, and was improved in every way. The physical signs remained unchanged. She did not attend again.

CASE VII.—James D., aged one year and eleven months, was brought with empyema of the left side on March 5th. Four fluid ounces of pus were evacuated, and consolidation of the upper lobe was left after the operation. On May 31st there were still tubular breathing, dulness, bronchophony, and some râles over this area. On June 5th the tube was removed, and on the 19th the resonance was very fair indeed all over, the breath sounds were vesicular and all signs of consolidation had completely disappeared.

CASE VIII.—Ethel M., aged six years, was first seen February 16th. The left upper lobe was solid, the temperature 103.2° F. On February 23d, the temperature was 100° F., the physical signs being as before. On March 5th, temperature was 98.2 F., and there was still consolidation. Dulness and tubular breathing were present on March 10th, but she was bright and lively. On the 23d, the lung was still dull and the breath sounds were of cog-wheel rhythm; but by April 6th the breath sounds were quite free and clear in every respect.

CASE IX.—James C., aged one year and six months, was seen on August 5th. He was said to have been ailing since birth, with his chest. His present illness commenced a month previously with diarrhoea and a cough. On examination, the breathing was loudly tubular at the right apex, back and front, extending down to the angle of the scapula posteriorly. There was deficient expansion, and coarse crepitations were heard below the scapular angle. He died on the 18th.

Post-mortem. The right pleura was adherent in several places. The surface of the right lung, the upper and lower lobes especially, were rough from adhesions. All the lobes were hard and of a dark-red color. The upper sank in water, the lower floated. The left lung and pleura were normal. All the organs were healthy. No tubercles detectable anywhere.

CASE X.—John M.,¹ aged one year and eight months, attended with an empyema on the left side, on October 29th. Seven ounces of pus were evacuated, together with thick pieces of caseating material, the upper lobe being left with signs of consolidation.

On November 5th the upper lobe was still solid, giving dulness and tubular breathing. The tube was discarded on January 25th, and he was sent to a convalescent home on March 9th, cured as regards the empyema. He was again examined on June 23d. The upper lobe was then absolutely dull, with marked tubular breathing, bronchophony and increased cry-fremitus. The resonance was deficient elsewhere in comparison and the entry of air not so good. The breath sounds were vesicular.

On August 9th the chest was of fluid dulness; in the upper axillary region there was deficient entry of air, and distant tubular breathing. An exploratory puncture went into solid lung. Scott's ointment was then ordered to be rubbed into the chest over the affected area, for ten minutes, night and morning.

On August 27th there was a note to the effect that since the commencement of mercurial inunction a marked improvement in the chest signs had taken place. The chest area corresponding to the upper lobe was still deficient in resonance in comparison with the other side, but this resonance was mingled with dulness. Breath sounds were then vesicular over this area; there was fair entry of air, and a few râles to be heard. The remainder of this side of the chest was deficient in resonance in comparison with the other side, but the entry of air was good, though not quite so marked as on the healthy side, and the breath sounds were vesicular. He was sent to Brighton the following day. The students in my class will remember seeing this case in October last, when I narrated his history as well as I could then remember. His chest was perfect as regards physical examination, and, with the exception of an

¹ This case was mentioned in *International Clinics*, January 1893. Article, "Pleurisy in Childhood," by the author.

adherent scar, there was absolutely nothing left to tell the tale of his former trouble. Consolidation lasted then, for certain, during a period of ten months, and probably did not completely disappear for some weeks, perhaps longer, after that examination.

Both in this case and in Case VII. the quantity of pus was small—far too little to bring about collapse of the apices. Such are merely instances of purulent pleurisy in association with pneumonia—a not at all infrequent starting-point of that disease in childhood.

In *International Clinics* (for January, 1893), when dealing with "Pleurisy in Childhood," I have already expressed my views, in these terms: "Such might pass for apical consolidation, and so it is—usually fibrinous, sometimes due to compression, occasionally tuberculous," which have, unfortunately, owing to a printer's error, been translated into: "Such might pass for apical consolidation, and so it is, usually fibrinous, but occasionally this compression of the lung by bands of lymph causes tuberculosis"—a statement which, of course, was never intended.

CASE XI.—James R., aged twelve months, was first seen on March 11th. He had suffered from cough for six or seven weeks, and had snuffled since birth. His mother had had two miscarriages. His brothers and sisters were syphilitic. About six weeks back he had a "bad chest, was hot, feverish, experienced difficulty in breathing, and suffered from thirst." Three weeks previous "lumps appeared on the hand and wrist." He had consolidation, tubular breathing, dulness, and bronchophony of the left upper lobe and apex of the lower. His rib ends were beaded and the anterior fontanelle one and a half inches long. The spleen was one finger below the costal margin, and his liver could just be felt. There were cutaneous gummata on the left knuckles, and a gumma above the left wrist on the radial aspect, also one above the right wrist, palmar aspect. Temperature 101.6° F., pulse 156, respirations 80. I took him into the hospital, and when there he was found to have green and offensive diarrhoea. On March 30th the following note appears: "The temperature now registers 99.2° F., the pulse is 154, and the respirations 44." The abscesses on the wrist were opened, as they were on the point of bursting. By April 2d he had rapidly lost flesh. The lung was then *in statu quo*. In the afternoon the breathing became labored, the pulse very feeble and irregular, and death supervened. The presence of cutaneous gummata at one time led to the suspicion that this might be an instance of syphilitic disease of the lung; but the complete absence of reaction to treatment, and the large size, considerably modified these ideas.

Post-mortem. There were thin adhesions of the upper, and upper half of the lower lobe on the left side—the lobes were united. The upper lobe and upper part of the lower lobe were of a red color and consolidated. The bronchial tubes were thickened, dilated, and contained pus. Radiating from the bronchial tubes were scars of different sizes passing in various directions, and intersecting the solid areas in varying degrees. The microscope showed a combination of croupous and catarrhal products. Here there were masses of unaltered fibrin; in other situations, fibrinous masses with catarrhal cells; in others, again,

catarrhal cells alone. The bronchial tubes were thickened, and presented more or less catarrhal inflammation. The above lesions were situated for the most part around the bronchial tubes. Some areas were quite healthy. In the areas of consolidation were noted proliferation of the alveolar walls and commencing fibroid changes. On the whole the catarrhal products were in excess of the croupous.

Judging from the shape of some of the alveoli, collapse had occurred. The autopsy further proved that this was a case of phthisis—although not apparent before microscopical examination—occurring in a syphilitic child. The gummata, which behaved somewhat differently to syphilitic gummata, probably owed their origin to a tubercular process.

On more than one occasion I have seen similar lung implication in young children; but here again, although not very marked, naked-eye gray or yellow tubercles were seen sparsely scattered throughout the affected area, leaving no doubt as to the nature of the process.

And here I must pause to say a word or two on syphilitic pneumonia of infants. Cases have been recorded by Greenfield¹—though in this case there is no positive proof of a syphilitic origin—one aged twelve months, and one by Mr. Charters J. Symonds,² aged one month. The former showed consolidation of the right lung of a yellowish-white color, with minute bands of fibrous tissue running through it. The latter where attacked was solid and fleshy. Both showed extreme fibro-nucleated growth and dilated thin-walled capillaries. Still remaining air vesicles were seen with and without epithelial proliferation. Although the child was an obvious congenital syphilitic, the microscope showed that the process was after all a tubercular one. At one time I thought it might be of syphilitic origin. Cases of this condition have also been described by Virchow, Wagner, Robin, and Wilkes and Moxon.

In my experience, cases of retarded resolution in association with pneumonia have been found, with a solitary exception of basic pneumonia, in those showing an apical, or the upper and part of the lower lobe distribution.

Given, then, such a case, its nature and the probable sequence of events have to be determined. It must be borne in mind that fluid in the shape of pus sometimes limits itself to the apex. If the case has been under observation since the commencement, then the gradual dampening of the signs of consolidation would lead to a suspicion of a fluid collection. Bronchophony and tubular breathing, previously well marked, become distant, or a dampened vesicular murmur may take its place; or râles, previously sharp, metallic, and close to the ear, appear now more or less removed. There may be rises of temperature, with nocturnal exacerbations, or this may be raised but little, if at all. The child may or may not appear ill. If such are met with at the first

¹ Trans. Path. Society of London, vol. xxvii. p. 43.

² Ibid., vol. xxxvii., p. 124.

examination, the possibility of a localized empyema must be borne in mind. When in doubt, do not hesitate to use the exploring-needle—its passage into a solid lung or cavity will solve the difficulty should any exist. This being negatived, is the consolidation of a simple nature, or does it owe its origin to a tubercular parentage?

Continued rises of temperature, night-sweating, wasting, gurgling râles, progressive invasion of the lung, and the attachment of the fellow-apex, are in favor of phthisis. But the opposite lung may show no signs, and the gurgling râles may be merely an evidence of dilated tubes. Sometimes the difficulties are very great, and only to be solved in the dead-house. But inasmuch as tubercular affections in young children are so often of the generalized rather than the localized variety, the presence of other tubercular evidence must be remembered, viz., abdominal symptoms,¹ brain disturbances, tubercles in the choroid,² tubercular cutaneous lesions, testicular implication,³ joint affections, and the like.

The fact that the consolidation remains *in statu quo*; that the particular signs referable to that condition persist, without much if any alteration; that the temperature remains normal; that the child, apart from auscultatory evidence, keeps well, both in mind and body, with obvious improvement in the general health, as gauged by appearance, increase of weight, and the mental condition, are all in favor of a simple consolidation of retarded resolution, whose final disappearance may or may not be heralded by crepitations. Time is all that is necessary, and time will clear up the nature of the disease. But in such cases as these an insidious fibrosis may be in motion—a fibrosis which, in some instances may be slight and but little progressive, or may pass on into a wide and far-reaching cirrhosis of the lung, with obliteration of its alveoli and general and extensive shrinkage of its bulk. Such a condition may or may not be associated with dilated tubes. Occasionally one sees in the post-mortem room slight scarring of a lung otherwise healthy, and it is just this scarring which may be a remnant of the condition previously mentioned, the branding of the organ, as it were, with the history of its former troubles. Such cirrheses may be of a simple inflammatory nature, and it is with these that I am now dealing, or they may owe their origin to a tubercular process.

Tubercular fibroses are seen in children, and in the majority of instances are easily recognized as such; but in others the microscope is required for their definition and detection, and as an illustration of this I have narrated the case of J. R. If a microscopical examination had

¹ "Tubercular Peritonitis, its Natural History and Treatment," by James F. Goodhart, M.D., F.R.C.P., and the author.

² "Tuberculosis of the Choroid," by the author; Illustrated Medical News, December 7 and 14, 1889, plates; Graduation Thesis, plates; British Medical Journal, 1890, plates.

³ "Affections of the Testicles in Hereditary Syphilis," by the author, Practitioner, 1892.

not been made, this lung, as far as outward appearances went, might have been readily passed into the group of simple cases.

Weber has narrated the cases of three children in whom the disease took origin in a croupous pneumonia, for which complaint he originally treated them.

In adults, such an onset has been occasionally observed. In a case of Charcot's,¹ death occurred three and one-half months after the onset of the acute disease, and the pathological changes were marked. A case of Osler's² died a month after the onset of the chill. The lung was uniformly solid and grayish in color. Some of the fibrin plugs were undergoing fatty degeneration, others fibroid organization, with great thickening of the alveolar walls. It was so in a young child under my care.³ Cases are on record by Mayne,⁴ by Coupland and Goodhart,⁵ and Greene⁶ has met with two cases in which the intra-alveolar exudation products were undergoing fibroid development. Wilson Fox insisted that bronchial dilatation is favorable to an indurative pneumonic process. Bronchial dilatation and peri-bronchitis are frequently met with in bronchitis or broncho-pneumonia, but only as part and parcel of the disease—of the same morbid inflammatory action.

Bronchial dilatation *per se*, in my opinion, is no more capable of inducing lung fibrosis than inflammatory lung mischief without bronchial attachment is competent to cause dilated tubes. As an illustration of instances of cirrhosis of the lung, I quote the following cases, proceeding then to discuss the methods of detection of this malady, and other details which have not been already gathered in the course of their narration.

CASE XII.—Isabel H.,⁷ aged five years, was admitted on September 9, 1892. Her family history was negative. She had always been well until August, 1891, when she had pertussis, followed by measles and pneumonia in November, 1891. In July, 1892, she had a bad cough, with yellow expectoration streaked with blood, and was treated for this as an out-patient. She now has night-sweats and has wasted.

On admission, there was dulness all over the front of the left chest and behind up to the spine of the scapula. The breath sounds were deficient all over the front of the chest and behind, from the base to the level of the scapular spine. Distant tubular breathing, with a few crepitations, were heard. Above the spine of the scapula the breathing was loud and tubular, with râles. Cardiac impulse (?) displaced upward internal to the nipple. This supposed upward displacement

¹ Thèse de Paris.

² Principles and Practice of Medicine, 1892.

³ "Croupous and Broncho-Pneumonia in Children, their Histological Identity." Practitioner, vol. xlv., No. 6, p. 433.

⁴ Dublin Hospital Gazette, May, 1857.

⁵ Trans. Path. Soc. London, vol. xxv. p. 33.

⁶ Pathology and Morbid Anatomy, 6th ed., p. 423.

⁷ International Clinics, January, 1893, "Pleurisy in Childhood," by the author.

was probably uncovering of the organ. Temperature 99° F. Respirations 48. Pulse 120. The case was thought to be one of empyema by the resident medical officer. The physical signs were identical; but it will be noticed that the heart was not displaced, a most important guide. Soon after admission an exploratory puncture was made in the eighth space, in the posterior axillary line, and about ten minims of pus mixed with air withdrawn. The child coughed after the needle was inserted, blood began to pour from her mouth and nostrils, and she died asphyxiated.

Post-mortem. The pericardium was hardly covered by the left lung at all.

Larynx: Full of frothy blood-stained mucus.

Bronchi: Full of blood-stained mucus, which extended on the right side as far as the medium-sized bronchi, and on the left into the smallest.

Right lung: Normal. Recent adhesions to thoracic pleura.

Stomach: Full of blood; a little blood in the duodenum. No sign of tubercle anywhere.

Left lung: This was small, showing a combination of cirrhosis, consolidation and induration of the lung tissue. The bronchial tubes were dilated and thickened, with scars radiating from them in all directions, and passing into cirrhotic, consolidated or indurated areas. Microscopically, these tubes showed an absence of mucous membrane. The basement membrane was infiltrated with leucocytes, and peri-bronchial infiltration was marked. Peri-bronchial, peri-vascular, and septal thickening were marked, the number of nuclei seen being variable. By these far-reaching fibroses the lung tissue proper was greatly curtailed. The bronchial walls, thickened and irregular in outline, look as if made up of granulation tissue. The changes in the alveolar walls themselves are various, from (though rarely) an absence of alteration to a most intense fibro-nuclear or fibroid induration, in which latter case whole areas are destroyed. The new tissue is exceedingly vascular. These changes appear to spread centrifugally from a small vessel or a bronchiole. The pleura is vascular and thickened, though but little. The alveoli show occasional very large granular cells with single nuclei. More frequently are seen catarrhal cells, or cells approaching leucocytes in appearance, or a combination of these elements. When the alveoli are much pressed up by fibrosis the catarrhal contents appear like a cubical epithelial lining. Further, some show an intra-alveolar material of varying size, which may or may not be stained fibrin masses with nuclei in them. Some show rifts, and others a certain fibrin-like network. The catarrhal cells do not seem to lend themselves to the new growth. They are there seemingly in a passive rather than an active condition, as far as fibrosis is concerned; nor can any organization of the fibrin be detected. Moreover, in some of the specimens they are very few and far between.

External to a large bronchial tube appears a tiny round-celled neoplasm, which seems to be undergoing fatty degeneration in the centre.

CASE XIII.—Catherine W., aged eight years, was kindly sent me by my friend, Dr. Hector Mackenzie, in December, 1892. Three years ago she suffered from whooping-cough. Her present illness "dated nineteen months back, with a hacking cough, worse in the morning." In February, 1892, she caught a fresh cold, and was kept in bed for two

or three weeks, when she was transferred to the Brompton Hospital, where she remained three and a half months. At this time her cough became worse; but during her stay in hospital she derived considerable benefit.

Her father died of "inflammation of the lungs and pleurisy," and was ill one month. Two paternal uncles are said to have died from consumption.

Her mother expressed surprise at the child "seeming so well," and considered the "only trouble was the cough." She sweats a little at night occasionally, and expectorates about a quarter of a teacupful of yellowish offensive material three times a day, and generally after meals, after which she seems better. The matter is faintly streaked with blood. When she lies down at night she "feels a sensation of sickness," and then without any great amount of coughing or straining she brings up about one ounce of thickish, curdy pus. At odd intervals during the day she is troubled with a slight hacking cough.

Examination. The chest on the left side is considerably shrunken, and moves but little. The *cardiac impulse* is heaving in the anterior axillary line, in the sixth and seventh interspace. Over this impulse the sounds are normal. Above the nipple the first sound has a cantering rhythm, and there is a doubtful bruit in it of presystolic and systolic time. Attending this is a presystolic and systolic thrill. Over the *infraspinatus* muscle the heart sounds are loud and ringing.

The left side of the chest is uniformly dull from apex to base, and this dulness extends to within a finger's breadth of the left of the sternum. In front there are coarse bubbling râles, with coarse respiratory murmur, and behind, loud, tubular breathing from the apex to the eighth rib, as far forward as the posterior axillary fold. Below, the respiratory murmur is deficient, and the râles are smaller. On the right side the breath sounds are extra-*puerile*. The lung is hypertrophied, and extends well to the left of the left margin of the sternum. The sputum was examined for tubercle bacilli, but none were detected. The organs were normal, and there was no clubbing of the fingers and toes.

CASE XIV.—Amos D., aged seven years, was said to have had no illnesses up to July, but then he "caught a cold," at a school treat, which was followed by pneumonia, and ever since he had been ailing. In the middle of January following he came under my care. There was no history of syphilis, nor was there any phthisis in the family.

On admission he was found to be an emaciated, feeble child, with clubbed fingers. Respirations 50 to the minute, pulse 125, and temperature 99.6° F.

The cardiac impulse was in the fifth interspace diffused, but most marked in the nipple line. There was also an epigastric impulse. The area of dulness was well to the right of the sternum. The left chest gave tympanitic resonance in front above the third rib, and the breath sounds were vesicular. Below this dampened tubular breathing and weakened vesicular murmur were detected. Behind, in the *supraspinous fossa* were vesicular breath sounds; below, over the middle third or more, there was tubular breathing of an echoing quality, and below this again the breath sounds were dampened. The whole chest behind was dull. Over the opposite side the breath sounds were extra-*puerile*. The left chest was considerably shrunken, and there was marked com-

pensatory lateral curvature. The urine was free from albumin. He suffered from troublesome cough, but there was but little expectoration. No tubercle bacilli. During the time he was under observation the physical signs changed from time to time. Thus, on one occasion, in the lower half, behind, and all over the front, with absence of cardiac dullness there was tympanitic resonance (stomach), and even whilst under examination the lung again became dull. Sometimes consonating râles were to be heard. On admission, the resident medical officer, suspecting pus, made an exploratory puncture in the ninth interspace, withdrawing a syringe-ful; but this was evidently from tapping a dilated tube.

Cirrhosis of the lungs is not so very uncommon in childhood. The chief signs and symptoms have been gathered by a study of the cases I have narrated. Retraction of the chest and compensatory lateral curvature may be but trifling. Thus, enormous dilated tubes may take up the portions of lung tissue, or the void left by a contracted lung relic may be filled up by an amyloid liver. Nor are dilated tubes invariably met with in cirrhotic lungs. Any portion of a lung may be attacked—the apex, the base, or both; usually, perhaps, the base when a single lobe is invaded.

In the case of implication of a single lobe there is no retraction of the chest, and the physical signs are those of consolidation, with consonating râles if there be any pus in the tubes, or gurgling râles if they be considerably dilated. There may be, with dulness, merely deficient entry of air without râles, or a few bronchitic signs.

Tubular or hollow breathing will depend upon the laryngeal intonation, and the latter may or may not denote dilated tubes. With one mode of respiration, the physical signs are those of fluid, with another the tubular character becomes apparent. The position of the heart is important. In left-sided lesions the organ may be uncovered, exposing a large portion, or the whole of its surface, with consequent diffusion of the impulse; or contracting adhesions with the lung, the heart may be displaced. Thus, if the right lung is attacked, the heart may be seen beating at the right nipple; if the left, pulsation may be detected up toward the left clavicle. Possibly anomalous murmurs from anatomical displacements, or a thrill, mayhap, may make their appearance. As time goes on, and as the fellow hypertrophied lung fails, the right side of the heart dilates, the fingers club, and the changes in the organs met with in this condition then make their appearance and stamp the case as one of secondary heart disease.

Prior to this, however, from the continual suppuration going on in the tubes, lardaceous changes in the viscera may occur, and the case become one of lardaceous disease. *Per se*, this condition of the lung gives rise, to commence with, to no particular symptoms, but the malady is detected by physical examination. The child may be fat rather than

the reverse, and apart from shortness of breath on exertion there may not be apparently much the matter with him.

Such is his condition during the warm weather, but on the advent of cold or adverse climatic influences, bronchitis or broncho-pneumonia make their appearance, and the child shows the symptoms and physical signs of these diseases, and wasting takes place.

This condition has to be separated from chronic pleurisy with effusion; for, as regards auscultatory signs, there may be but little to choose between them; thus dulness of fluid character, impaired or nearly absent vesicular murmur, with a few bronchitic signs, may be the order of the day, or there may be distant tubular or hollow breathing. As far as these signs go, to make a definite decision would be an impossibility.

With a cirrhused lung and a vesicular murmur, this is conducted from the healthy side. Occasionally one has an opportunity of observing the solution of such a phenomenon at an autopsy.

The position of the cardiac impulse, and the positive or negative results obtained from one or more exploratory punctures, should determine as to its nature. That such a puncture is not without danger in cirrhotic cases has been amply demonstrated by the case I have narrated. Further, it must be borne in mind that a dry tapping does not of necessity mean absence of fluid. The behavior of the needle after its passage through the chest-wall, whether into a cavity or solid lung, must be carefully noted. Further, the withdrawal of pus does not mean of necessity free pus in the pleural cavity; the pus may come from a dilated tube, or what not. The use of this instrument in an intelligent in contradistinction to a perfunctory manner should prove of the utmost assistance.

Further, this disease has to be separated from an invasion of new growth in the lung. Attention directed to the mediastinum, which is almost always attacked, should prevent any difficulty in this direction.

Sometimes ulceration of the dilated tubes takes place, and then, with offensive purulent sputa, a hectic temperature, and severe wasting, the child rapidly passes down hill. A microscopical examination of the sputa will in these cases reveal yellow elastic tissue. The sputa will not contain tubercle bacilli. Of course, however, it is quite possible, and highly probable in some cases, that tubercular infection has taken place secondarily, though the possibility of tuberculosis being the *fons et origo mali* must be well borne in mind. If such were the case, it is highly probable, though of course not absolutely certain, that the fellow lung in advanced disease would commence to show signs of implication.

From pneumonia of delayed resolution to fibroid pneumonia there is, as I have shown, a wide gap; and yet, not so wide after all, in some instances. Much will depend upon individual cases, and it is by no

means an easy question to foretell the probable, or perhaps rather the possible, course of any consolidation.

That a consolidation can remain in abeyance for very many months, and then finally clear to physical signs, is a fact of very great importance indeed, and should at least teach the lesson of not too hastily jumping to a conclusion. On the other hand, in some cases, a few weeks alone have been found necessary to bring about any decided fibrosis of the organ. The pneumonia of delayed resolution is, *per se*, not dangerous; it becomes so if resolution does not come to its assistance. In such cases, as far as my own experience goes, the rubbing in of Scott's ointment, or some other mercurial ointment, has appeared to me a remedy of very considerable value. It has roused the dormant activity of the parts and has been attended by results of an encouraging nature. At this stage it is obvious that the line of treatment must be directed to the induction of such a desirable termination. There is no doubt that the longer the powers of resolution are deficient, the greater is the danger of a smouldering, though terribly destructive process going on. In addition, the general health must be improved in every way by tonics; iodide of potassium internally, good feeding, and change of air. For the latter, Newquay, in Cornwall, is an ideal resort. I do not confine patients to their beds under such circumstances. Full expansion of the lungs should be invited by gentle exercise, short of fatigue and of exposure to east winds and to damp and wet.

With a fibroid lung, all remedies must of necessity be palliative rather than curative. But much can be done even here, by placing the patient under suitable hygienic conditions. Thus cold, damp, and wet are to be avoided absolutely. Residence in a warm and equable climate, such as Ilfracombe, Torquay, the south of France, or Egypt, will at least make life endurable, and prevent the advent of bronchitic or broncho-pneumonic attacks, which are terribly frequent and harassing under adverse circumstances.

Tonics, suitable clothing, and good food, must be chiefly relied upon. With fair general health there is much less liability to bronchitic attacks. Acute attacks must be dealt with on the usual lines. With bronchorrhœa, inhalations of carbolic acid, creasote, iodine, and turpentine may be used with advantage, and the latter may be administered internally. Excessive coughing must be alleviated by opiates and chloral, and indications of cardiac failure combated by the usual remedies.

ON THE COURSE AND TREATMENT OF CERTAIN
URÆMIC SYMPTOMS.BY BEVERLEY ROBINSON, M.D.,
OF NEW YORK.

IN beginning my paper I wish to say that I am in doubt as to the title of it. In some respects I would prefer to use the designation "symptoms of renal insufficiency, or inadequacy" rather than "uræmic symptoms." I make this statement because *uræmia* does not satisfactorily express, as we all know, our belief to-day in regard to the precise etiology of many cases in which the kidneys are no doubt at fault primarily or secondarily. If, however, I employ the designation *renal insufficiency*, I feel that exception may be taken to the title, as I shall speak of cases in which the kidney is surely affected with well-defined structural changes, and the term *uræmia*, as it is generally received, implies this belief in the majority of instances.

In my daily routine, especially of private practice, I meet with cases of the kind I shall at first try to describe, and with which doubtless you are more or less familiar. The patients to whom I refer are, as a rule, what are called healthy, *i. e.*, they have no distinctly marked organic changes which are discoverable in their different organs; or these changes are so slight in amount that I cannot fairly attribute major importance to the state of one organ as compared with others, without the most careful analysis of all the conditions involved. Such patients, however, have habitually some little bodily annoyances which fret them more or less, and from which they desire to be relieved, and they naturally seek, sooner or later, the physician's care. In regarding these patients at present, I am satisfied that many of them suffer primarily from slight renal disorder. This affection of the kidneys, mainly functional, is at times more pronounced, and occasions symptoms which hitherto we have considered under the term *uræmic*.

In the mildest forms of the trouble, I believe renal insufficiency is a more appropriate term, particularly if we limit its proper significance. I am aware that the term itself is frequently employed in descriptions of *uræmia*, although I have not found an article or chapter in which the epithet was used as the *title* of a recognized condition. By adopting this name with this purpose, we shall be able hereafter to employ it to cover a definite series of symptoms, which, in my judgment, are not otherwise properly designated.

I will now narrate a few cases in my later professional experience which shall serve as a text to explain my position.

CASE I.—A lawyer; widower; fifty-five years old; a man of large frame, who has enjoyed excellent health. In the winter months he

suffers from nasal obstruction and formation of excess of mucus in the naso-pharyngeal space, which he relieves by efforts of hawking. Patient has a somewhat constipated habit, and his urine is often higher colored than is normal. Frequently, however, the density and color are normal. It contains at these times no abnormal ingredient. Whenever the density increases and the color is darker, there is a heavy deposit of pink urates; but there is no albumin, no sugar, and rarely, if ever, any casts. The quantity of urine voided, as a rule, approximates the normal. When the color becomes dark and the density increases, the quantity diminishes, but not usually to any great extent. The patient under the latter circumstances suffers from general neuralgic manifestations, mild in form, and which rapidly disappear under judicious medical management. Appetite is excellent; no dyspeptic symptoms ordinarily; lives well, but commits no excesses. Very moderate in the use of wines or distilled liquors. No attacks of rheumatism or gout. He finds himself much better in health when he eschews sweets and butchers' meat; feels more buoyant and in better shape when his meals consist mainly of vegetables, and particularly rice, and when he eats white meats, fresh fish, and eggs. On several occasions, I have attended him professionally, when, without knowledge of the precise cause of his attack, he has had sneezing and running of the nose; little or no fever; slight cough; no evidences of stomachal derangement, and yet he was evidently torpid or sluggish and complained of marked drowsiness. The urine at these times was dark-colored and loaded with urates. A mercurial, followed by a brisk saline purge, on two successive days, rest in the house, the free use of natural Vichy water, and very light diet, cured these manifestations of disordered function, and in a few days he resumed his occupation and was as well as previously.

CASE II.—A broker; forty-two years old; married; thin and spare; of an energetic, resolute character; states that several years ago he passed a small mulberry calculus, but previous and subsequent to this attack has had no disease for many years. His urine is habitually somewhat high-colored, otherwise normal; his intestinal digestion is imperfect; he is somewhat constipated at times; again he has two movements in the twenty-four hours, which are formed, but not as large as would seem to be healthful, due regard being had to the amount he eats. His diet is varied, abundant, but not excessive. He drinks wine moderately; he smokes, but not to excess. He is often annoyed with vague pains in his abdomen which extend into the lumbar region. These pains are not severe as a rule, and usually are merely uncomfortable sensations. His abdomen is perhaps slightly distended and tense, but he is scarcely annoyed with flatus. The epigastrium is somewhat tender on pressure, as also, occasionally, are other regions of the abdominal cavity. There is no manifest stomachal dyspepsia. The vague abdominal pains come at irregular intervals during the day, last a variable time, and disappear quite suddenly. Patient is rendered irritable and somewhat morbid by reason of his abdominal condition. He is also conscious of a slight laryngeal irritation which obliges him to expectorate a small quantity of viscid phlegm occasionally. His tongue is broad, slightly coated on the dorsum; his skin is sallow; his liver is not enlarged. Strict regulation of the diet, as in the previous case, the regular use of euonymin, podophyllin, or cascara, persistent drinking of Giesshübler or Vals water, have ameliorated but not cured my patient.

Latterly, I have prescribed salicylate of bismuth in addition to what precedes, with the hope that intestinal antiseptic thus produced would be effective in controlling the symptoms of functional disturbance which I have outlined and which I have been led to believe were caused by renal insufficiency.

CASE III.—Only a few weeks since I was called suddenly to see a near and dear relative who had been attacked with alarming symptoms of obstinate nausea and vomiting, marked cardiac weakness, and with but few or no evidences in the urine, except just before the fatal termination, of renal complication: at this time a small quantity of albumin and hyaline casts were discovered. The patient was fifty-eight years old, the manager of important railroad lines. He had always been remarkably strong and active. Owing to great irregularity of meals and the immoderate use of tobacco and whisky, he was a sufferer frequently from flatulent dyspepsia, which he relieved with large doses of bicarbonate of soda. Some weeks previous to his death he had an attack of pneumonia, moderate in severity. From this attack he had nearly recovered, when, by reason of over-fatigue, anxiety, and exposure, a mild invasion of acute articular rheumatism developed. The fever had disappeared and he was almost convalescent from this disease when, owing to the immediate effects of a cold bath, the final symptoms occurred, and were regarded by the family physician as evidences of Bright's disease. When I saw the patient I thought the kidneys were congested, but secondarily to the action of a weakened heart, and were connected with engorgement of the other viscera under a similar dependence. This was eminently true of the lungs and liver. No doubt it was the giving way, functionally, of several important organs, that was the cause of death. Whilst this is true, it is also highly probable that the condition of the kidneys, which had become more and more insufficient, gave the terminal features of the combined conditions, to a greater degree than any other of the organs involved.

CASE IV.—A broker; bachelor; thirty years old; of a nervous, excitable temperament; suffers somewhat from symptoms of flatulent dyspepsia and irritable heart. His bowels are frequently torpid; his urine habitually slightly high-colored. Habits are temperate—drinks little; does not smoke. No gout or rheumatism. After an elaborate dinner at which he drank different wines—but not to the point of inebriety—he went home and slept. In the early morning he had repeated attacks of vomiting and diarrhœa. Accompanying these symptoms there was moderate headache and annoying palpitations. His pulse was rapid, weak, depressible, and irregular. His heart action was also much disturbed; it was rapid, irregular, and the impulse weakened. There was a soft systolic bruit accompanying the second sound over the pulmonary area. Apparently the cardiac cavities were somewhat dilated. The tongue was clean and yet nausea was distressing. No tenderness over the epigastrium or anywhere in the abdominal cavity. The urine had been smaller in quantity since the night previous, and instead of being dark in color, was very light. Under the use, first, of ammonia and bismuth, with broths, milk, Vichy, and rest in bed, he improved rapidly. His heart grew stronger; his urine became more concentrated and larger in quantity.

When the first symptoms disappeared, strophanthus and nux vomica were added to the previous treatment.

Such cases as the foregoing may be differently designated, I am quite aware, and at times are considered of little moment and scarcely worthy of very careful consideration. I have known many such attacks regarded as the usual outcome of excesses of the table, and put down in the broad category of a bilious attack. In one sense they are, without doubt, if we mean by that to express the idea that the liver is incidentally interfered with as to its physiological function; but while this may be true, I claim *now* that such cases are correctly interpreted in recognizing that the kidneys, by their temporary insufficiency, occasion most of the symptoms reported, in a very direct manner. It is also evident that strengthening the cardiac contractions and giving more vascular tone to the general circulation will be found useful. These indications may indeed be urgent. Is it not obvious, however, that it is the retention in the economy of the waste substances, made suddenly enormous by reason of dietary indiscretion, which brings on the threatening symptoms, which require relief by all rational methods? Nature makes every effort in these cases, by frequently repeated vomiting and purging, to clear the body, through these natural emunctories, of the poisonous fermenting ingesta which enter so largely as a factor in the direct causation of such explosions. The rest in bed; the gentle and continuous warmth to the surface; the liquid diet, which is the most rational diuretic as well as food, the quieting effect of the ammonia and bismuth on the irritated stomachal mucous membrane, and the stimulating influence of the former in relieving general depression, were rapidly followed by beneficial effects. As soon as practicable the heart was strengthened and regulated to overcome the effects of diminished arterial tension throughout the body, but particularly in the kidneys, whose functions should be re-established in order to restore equilibrium to the economy.

CASE V.—A maiden lady, forty-five years old, thin and spare of body, passed her menopause without functional disturbances; she has always been healthy and vigorous; has a good appetite and digestion; bowels regular; heart action normal; no malaria, rheumatism, or gout. Patient suffers from obstinate, recurrent headaches every morning. After she awakens, gets her coffee and a light breakfast, they frequently disappear, or become less intense. At times they continue during many hours of the day, and only disappear, completely, without apparent cause, to return again the following morning. The urine is normal in quantity, rather light in color, containing no abnormal substances. In this case there was no cardiac hypertrophy and no increased vascular tension—at least, neither one nor the other could be affirmed after careful examination. Almost every rational explanation of the headaches was attempted, and on each occasion followed up by appropriate treatment of the supposed cause, without beneficial effect. Finally, I thought that imperfect elimination of the products of mal-assimilation through kidneys functionally insufficient, and which possibly were affected with the precursory stage of interstitial nephritis, might account for the headaches. Thereupon I prescribed nitroglycerin in the ordi-

nary dose of one minim of a one per cent. solution every four hours, and very soon the headaches were relieved, if not cured. I now felt tolerably sure that my interpretation of the case was correct.

I might multiply examples of different kinds pointing to what I would call insufficiency of renal excretion, with many minute details, but this narrative would merely prove wearisome.

In many instances of obstinate nasal, naso-pharyngeal, laryngeal, and tracheal inflammation, chronic in type, I am now firmly convinced that the inactive functional condition of the kidneys is the primary cause of these inflammations. An imperfect blood-supply, containing in it many elements which should be eliminated through the kidneys, is rendered a source of morbid manifestations in the whole mucous tract—sometimes of the respiratory organs, sometimes of the organs of digestion and assimilation. Doubtless, also, the renal congestion which originates, as it were, this vicious circle is heightened and made more intense by the blood loaded with excrementitious substances, which come to the kidneys continuously, and which, provisionally, they are unable to get rid of. In such cases I have often found, after the bowels had been freely moved, and the mucous linings capable of being reached with suitable topical applications had been treated, that a diuretic solution, such as the liquor ammonii acetatis, frequently given, produced the happiest results after it had been taken during several days in a regular manner.

I have noticed the preceding conditions on several occasions follow bad colds, of the nature of grippe, or attack of influenza, and in these instances have assumed that the specific nature of the disorder of the respiratory tract and general system had much to do with the evidences later on of renal insufficiency. In other cases, in which there could be no doubt, to my mind, that there were organic changes in the kidneys of the nature of chronic parenchymatous or interstitial nephritis, by reason of the specific gravity of the urine, the deposit of albumin frequently contained in it, and the frequency with which different kinds of tube-casts were found on microscopical examination, I have found the symptoms referred to in the cases reported, but seemingly of graver significance, because they were united with manifest organic renal changes. Almost invariably, as we know, all undue fatigue, intense emotional excitement, errors of diet or drink, cold and exposure, will aggravate renal disease and bring on, rapidly or slowly, disquieting symptoms. Knowing the previous condition of the kidneys, we can never prudently ignore this knowledge when we care for such patients.

CASE VI.—A distinguished architect of New York has been one of my patients, off and on, for at least eighteen years—indeed, during nearly all my professional life. This gentleman, now over sixty years of age, is a man of great industry, great talents, and remarkable professional success. Once or twice in the course of every year he has an

acute gouty attack affecting the metatarso-phalangeal joint of the big toe of one or the other foot. Sometimes these gouty attacks in the small joints of the feet come on without premonition; sometimes a bronchial or slightly asthmatic attack precedes them. During the whole period I have taken care of this patient he has had urine light in color, of low specific gravity, containing a variable quantity of albumin and some granular and hyaline casts. Whenever these bronchial, or, frankly speaking, gouty attacks are upon him, and in view of my knowledge of the condition of his kidneys, I am always very solicitous in regard to their outcome. I have seen him when the thoracic oppression was very intense, the heart beating irregularly, rapidly, and feebly, and the pallor and pinched expression of the face were striking and alarming. Accompanying this condition there were disseminated moist and sonorous râles in the chest, and the urine looked almost watery, and was diminished notably in quantity. Under these circumstances I have found that repeated doses of colchicine and the free use of Friedrichshall water were the most useful medicinal remedies to employ. Rest in bed and fluid diet were insisted upon, and in some instances counter-irritation or revulsion to the back was deemed advisable. Subsequent to such attacks, giving up business affairs and travel were strongly favored, and when indulged in, rapidly brought about a state of well-being and the return to usual conditions.

In the evident gouty cases, and particularly in those where the heart-action is good and the tension in the arteries not excessive, colchicine is a more valuable remedy than nitroglycerin. In instances, on the contrary, in which the arterial tension is well marked or excessive and the heart laboring, whilst the quantity of urine is small and low in specific gravity, I believe it is wise to begin treatment with nitroglycerin or the nitrites. In any very alarming expression of this condition, inhalations of nitrite of amyl should first be employed. We shall sometimes be disappointed in the efficacy of these agents, and it is, I believe, whenever we have been committed to the error of believing that there is hyper-tension in the peripheral arterial system, connected or not with spasm in the vessels of the kidneys, or some other important viscus. Frequently, the so-called increased arterial tension is merely the consequence of atheromatous thickening of vascular walls, and the blood, instead of being under too great pressure, requires increase of the *vis a tergo* to make it circulate more freely and with greater energy. This may often be attained by the use of caffeine or digitalis, and as a result of the effective use of one or both of these remedies, we are forced to conclude that the renal phenomena proceed directly from an enfeebled heart, and the true way of managing such cases is really not to make so direct an appeal to the kidneys, in the first place, but rather to the muscular heart-structure. In strengthening the latter we help the former in a much more obvious and important manner. When, however, we are not quite sure to what extent the kidneys originate the series of pathological events and also tend to keep them up, it is judi-

cious to watch very carefully the administration of digitalis. I am convinced that whenever the renal function is markedly insufficient and the urine is greatly diminished, or perhaps wholly suppressed, we are liable to have those curious phenomena in the heart-beats and in the pulse, not to speak of nausea and vomiting, which show accumulation of this drug and its poisonous effects upon the economy. In many instances it is relatively simple to distinguish, in a differential way, the part played by the two conditions relative to cause and effect. In others, we are left in great and reasonable doubt, and our judgment in the matter remains most uncertain.

In regard to the simple question of the amount of arterial tension in the radial arteries, I know of nothing more difficult at times than to accurately estimate it—one reason being, besides the one already given, the amount of soft tissues about the artery at the wrist. Even with the use of the sphygmograph we may be unable to decide the matter, for the simple reason that tracings with this instrument are only valuable when made by an expert. Otherwise, we are liable to run into very great errors of interpretation. This is mainly due to the fact that it is very difficult to fit the instrument on any wrist so that we can form a perfect estimate of the directness and accuracy of its pressure over the artery.

CASE VII.—A widow, of large bulky frame, about sixty years of age; takes very little exercise, but drives a great deal and lives most of the time in the open air, in summer at Newport, in winter at Cannes. She is careful with her diet, as a rule, but commits occasional imprudences in eating rich or sweet food; almost invariably she pays the penalty of these errors by nausea, stomachal distress, pallor, and a subicteric hue of the skin. The pulse becomes weak, rapid, and depressible, the heart action fluttering and feeble; sometimes the bowels are torpid; sometimes there is and has been more or less diarrhoea, amounting to several loose movements in the twenty-four hours. I have known the attacks once or twice to be of a different kind: instead of the previous symptoms, the head ached intensely; there was torpor and somnolence; the speech was thick, the ideas came sluggishly; the face was somewhat drawn down on one side; the pupils were contracted, and there was more or less nervous irritability, as shown by slight fibrillary muscular twitchings. Seven or eight years ago, at the period of these latter symptoms, the urine was ordinarily of low specific gravity, moderate or abundant in amount, and containing a small quantity of albumin and granular casts. Although the patient had been told that her condition was gouty, and this was true in a certain sense, yet she had never had either a frankly determined attack of gout or rheumatism. Compound cathartic pills, strophanthus, digitalis, and nitroglycerin have all been useful at times, and singular to say, the use of Warburg's extract has sometimes enabled me to be of the most manifest benefit, when the other agents completely failed. I suspected, therefore, very strongly, a malarial element, without, however, being able confidently to affirm it. Sometimes I have thought it possible that Warburg's extract was useful

simply as an hepatic stimulant, and thus helped notably to relieve evident uræmic phenomena. Whenever I had gotten rid of the threatening phenomena in this case for a time, I insisted upon a milk diet, koumyss, matzoon, milk and Vichy, etc.; massage daily, or every other day; oxygen inhalations and repeated doses of digitalis in tablet triturate form. Every winter and spring, for several years, I have sent her to the south of France, and thus far she has held her own, and, indeed, I should say, to-day she is in better physical condition than she was several years ago.

In the preceding case and the one narrated before it, I have more than once seen what I believed to be evident and pernicious effects resulting from the use of even small doses of opium or morphine in some form—given by the mouth, for I have never had occasion to resort to the use of morphine hypodermatically in either of the preceding cases. One of the interesting features in my last case is this: During the past two years the character of the urine has changed in a remarkable manner; as a rule, this is no longer light-colored, of low specific gravity, containing albumin and granular casts; on the contrary, it is of a fairly deep color, does not generally contain any albumin, and on several occasions has shown no casts when examined very carefully and by expert microscopists. What is my conclusion? Have I cured a case of interstitial nephritis or not? I will not pretend to solve this difficult question. I would simply report a very interesting clinical fact in my own private experience, of which there may be many in that of my listeners, so far as I know.

I now wish to speak of the use of opiates, and more particularly of morphine in these latter cases, whenever respiratory or other symptoms, such as obstinate or distressing insomnia, seem to require their employment. Personally, I am and always have been much opposed to the use of opiates, and especially of morphine hypodermatically, whenever used in cases of chronic Bright's disease, except in very minute doses. I believe I have seen it do harm so often in locking up the secretions, when just the contrary was imperatively required—in bringing out further symptoms of uræmia, acute or chronic—that it appears to me reasonable to abstain from this medication as long as possible. If its use is forced upon me by symptoms that I have vainly endeavored to relieve by other drugs which are more innocent in their effects, I always make use of it with great care and watchfulness.

There are times, however, when I do not feel in this way, and where uræmic symptoms are unquestionably manifest. In general terms, these are the cases in which the heart is the weak organ primarily, and in which the kidneys will be greatly helped by cardiac stimulation of an active kind. Of the numerous drugs which strengthen, quiet, and regulate a weakened, dilated heart, none at times is comparable to the hypodermatic use of morphine in small or moderate doses. Therefore, when this condition

is obviously the cause of the distressing or threatening symptoms, I am not unwilling to recur to its use. If blood pressure is low, as shown by slight, imperfect arterial tension in the radials, and if the pupils are normal or somewhat dilated, with the previous condition also clearly defined, I am not averse to morphine medication in the manner I have mentioned. Unquestionably, when thus employed, I have had no good reason myself to regret making use of it. When, however, with the weak, irregular, or failing heart, are also present the pulse of lowered tension and the contracted pupil, then I would cry *halt!* because I believe these conditions often mean poisoning from retention in the system of excrementitious substances of different sorts and more or less poisonous, which may rapidly overwhelm the economy in their disastrous effects unless the clear indications of treatment are distinctly made out and followed by the practitioner. Again, in cases where we are in great and legitimate doubt—as we frequently are—despite our most careful scrutiny of a given case, as to which organ, the heart or the kidneys, most evidently needs immediate help—in these cases I advise against morphine hypodermatically as long as possible, on account of the possible immediate and great harm which may follow its use.

Alongside of these cases, and as a further development of similar underlying conditions, is what we often see, *i. e.*, uræmic convulsions actually take place. The quite general teaching of more than twenty years in New York City, owing perhaps more to Prof. Loomis's influence as a very prominent clinician than to anyone else, has been to the effect that morphine hypodermatically in large and repeated doses in acute uræmia has done what no other drug with which we are familiar will do. It will bring the convulsive seizure to a rapid termination; it will at times prevent the recurrence of it; it will break up arterial spasm, it will thus lessen arterial pressure; it will promote diaphoresis; it will greatly increase the bulk of the urine when this secretion is diminished or almost suppressed; it will bring back to life when hope seems almost lost.

In view of the facts so graphically and forcibly brought to our attention by Dr. Loomis—narrated with all the clearness, talent, and ability which characterize his work—we should be loath to throw aside the instruction afforded by the close study of his cases. Inasmuch, however, as I have seen, I believe, disastrous results follow this kind of interference; and when these results could not, in my judgment, be properly explained by the natural development of the renal disease, it is only right that I should endeavor to seek for the cause of this discrepancy. I have allowed my reasons to be seen in part in my foregoing remarks, and I would further add that whenever the convulsive seizure of acute uræmia is evidently directly occasioned by a spasmodic condition of the vessels of the kidneys, and this spasm is more or less general in the

bloodvessels of the body, including in many cases the cerebral mass and the medulla oblongata, I have little doubt that the remedial effects of morphine injections, in tiding over a most critical period of disease, are very remarkable. But let us bear in mind, as the perusal of Loomis's cases and numerous others will distinctly show, that the convulsive seizures were accompanied with *dilated pupils* and a more or less disturbed, perhaps weak, heart action. Moreover, in the coma which habitually follows just such attacks, after the use of morphine, or sometimes, indeed, without its use, the pupil may become of pin-hole size, or very much contracted; the heart may be laboring just as much, or even more, and the kidneys may not secrete an increased quantity of urine. I regard such cases as being among those in which the system is even more overwhelmed with the so-called uræmic poison than the previous ones, and to which I would fain direct closest attention.

In this translation of the immediate or prolonged effects of renal insufficiency, of systemic poisoning thus occasioned, whether occurring in Bright's disease or in mere functional disorder, we must look to several concealed factors involved in the clinical estimate which we should make. In one aspect, the kidney is nothing more than an ordinary filter; in another, it is an *elective* filter, depending, no doubt, for this power in part upon the precise anatomical and pathological conditions affecting it; depending also upon dynamic or vital forces, in regard to which we are almost in the dark even at the present day. Suffice it to add, however, that strictly scientific investigations, more particularly of Feltz and Ritter and of Bouchard, have shown how various are the poisonous ingredients of the urine, and how it is that at different times the kidneys will allow some of these poisons to pass through them, and again will not. Besides, the effects of the retained poisons are very different according to their nature—some doubtless accounting more than others for the pupillary and nervous symptoms; some producing excitement, others depression, lowered temperature, somnolence, and torpor.

These different poisons may also be eliminated from the economy even at short intervals in unequal amounts, and, of course, *different* morbid effects are thus produced, or similar effects in an unequal degree, in view of the combined nature or quantity of the retentions in the economy.

We should also be now convinced of another fact, and it is that neither the condition of the kidneys nor the heart, as shown by pathological researches, will prove satisfactorily, in many instances, the cause of the uræmic symptoms or seizures. We are, therefore, forcibly compelled to look for the source or primary cause of the symptoms elsewhere, and it is often in the digestive tract that we shall most certainly find them. The control of the quality and quantity of the ingesta; the proper and prolonged neutralization of poisons continuously produced

in this system, will thus become a means of prophylaxis against uræmic developments of milder or greater intensity, which will be found second to none. So soon as the most urgent symptoms of acute uræmia are neutralized or antagonized, judicious antiseptics of the digestive tract is a treatment which has the greatest value. Among drugs useful in carrying out this remedial indication, I would speak favorably, from repeated experience, of salicylate of bismuth and beta-naphthol.

In conclusion, I would add that I am convinced in very many such cases, especially among the residents of our cities, in the winter time, oxygen gas by inhalation several times daily, plays a very important remedial rôle. Banishment to a warm, equable climate for the cold or variable months of the year is, of course, generally speaking, a far better substitute than artificial inhalations of oxygen; but this plan, I regret to say, is often wholly impracticable.

FURTHER NOTES RESPECTING THE THERAPEUTIC USE OF THE SHEEP'S THYROID.

BY JAMES J. PUTNAM, M.D.,
OF BOSTON.

SINCE the case of myxœdema and acromegaly reported in *THE JOURNAL* for August were first described,¹ several changes have occurred which are worth noting.²

The principal points in the pathological anatomy of the latter disease are brought out by the diagram which I now append, though, since the cases on which it was based were collected, several new autopsies have been reported. The number of autopsies is so small that the percentages have a limited value.

CASE I. has continued to do well under the thyroid treatment. An important point has shown itself, however, with respect to dosage. During a good many weeks the patient took two and half grains of the desiccated gland once a day. This controlled the symptoms in a great measure but not wholly, a slight œdema of the eyelids making its appearance after a while, which has since then disappeared.

The later history of CASE II. is interesting in several respects.

The albumin and casts have disappeared from the urine, and the œdema of the ankles is only seen after exertion.

¹ The paper was originally read at the meeting of the Association of American Physicians in May of this year.

² I wish to call the attention of the readers of *THE JOURNAL* to the fact that the diagram printed with the article in the August number was, by a misunderstanding, put upon the wrong page. It was intended to indicate the percentage frequency of the different organ-changes in myxœdema, not those in acromegaly.

During the months of May and June no thyroids were taken. For the first three or four weeks no marked change was noticed. Then the symptoms began to reappear, and by the end of the second month the aspect of the face was nearly as myxœdematous as it had ever been. In spite of this, however, there were no albumin or casts in the urine, and no mental changes. With the resumption of the treatment the patient immediately began to improve again. It is also of especial interest that during the period of no treatment the thyroid gland increased very much in size, and the rapidity of the pulse increased likewise. When the treatment was resumed the thyroid again diminished in size. On further inquiry into the early history of this patient I learned that she had suffered considerably in her youth from palpitation and anæmia.

No. OF CASES.	1	2	3	4	5	6	7	8	9	10
THYROID. 71%										
THYMUS. 75%										
PIT. BODY. 67%										
PERIPHERAL NERVOUS SYST. 100%										
KIDNEYS 60%										

The patient with acromegaly has distinctly improved in many respects, though not in all. The size of the hands, feet, and face has steadily diminished, and the strength of the hands has markedly increased. The figures representing these changes are as follows:

	April 17, 1893.	June 13, 1893.	July 18, 1893.
Girth of thumb	3 $\frac{1}{4}$ inches.	2 $\frac{7}{8}$ inches.	2 $\frac{3}{4}$ inches.
" " second finger	3 $\frac{3}{5}$ "	3 $\frac{1}{16}$ "	2 $\frac{9}{16}$ "
" " hand at knuckles	9 $\frac{1}{4}$ "	9 $\frac{1}{4}$ "	
Length of second finger	4 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "
Girth of wrist at largest part	7 $\frac{1}{2}$ "	7 $\frac{1}{2}$ "	7 $\frac{1}{4}$ "
Dynamometer		{ R. 25 "	45 "
		{ L. 10 "	20 "

The feet have diminished in size so that she now wears a boot that she could not at first get on.

It will be noticed that these changes do not affect the length of the fingers, and it may be that the improvement has been only in respect to a diminution in size of the soft parts, as in the cases of obesity, and does not indicate any real neutralization of the disease. The patient has certainly grown somewhat thinner in all respects.

The pulse is still rapid and the general condition not satisfactory, though better than before treatment was begun.

The apparent improvement of this case under thyroid treatment naturally brings up again the question touched upon by various writers as to the possibility of a connection between acromegaly and disease of the thyroid, or its kindred organ, the hypophysis. With regard to this question I have nothing additional to offer, except to call attention to the fact noted in my paper, that there is occasionally a certain likeness between cases of myxœdema and cases of acromegaly—although typical cases, of course, differ widely. The two cases spoken of in the paper as presenting points of resemblance to both these affections, while not sufficiently characteristic of either one to justify a positive diagnosis, have both improved in some measure, under the thyroid treatment. The improvement has not, however, been positive enough to increase my willingness to make a definite diagnosis.

Two of the three patients with obesity, referred to in a foot-note in the August number of *THE JOURNAL* as being under treatment by thyroids (as suggested by Dr. Barron, of Liverpool), have improved very much. One of them has fallen in weight from two hundred and seventy to two hundred and thirty-seven pounds within four months. The decrease has been steady and even, and is still going on. No change was made in his diet or habits. The other patient who has been under the care of my colleague, Dr. F. Coggeshall, has lost forty-seven pounds. A third patient has not improved. All these patients have been taking the desiccated thyroids in the dose of grs. v. to grs. x. daily.

A CASE OF PANOPHTHALMITIS, CAUSED BY THE BACILLUS COLI COMMUNIS.

BY ROBERT L. RANDOLPH, M.D.,
OF BALTIMORE, MD.

(From the Pathological Laboratory of the Johns Hopkins University.)

G. W., aged six years, while drinking at a pump was struck by a companion across the left eye with a piece of wire. He complained of pain, which lasted a few minutes. That night he awoke with violent pain in the injured eye. The next afternoon, twenty-four hours after the injury, he came to the Presbyterian Eye and Ear Hospital.

The condition of the eye was as follows: Penetrating wound of the cornea, extending entirely across the lower border. This wound passed in through the iris and into the ciliary border of the latter. Intense pericorneal injection, contracted pupil, with shallow anterior chamber.

Atropia was ordered to be instilled every four hours, and a compress bandage was applied. The next day the cornea was infiltrated all along the edges of the wound, and in addition to this, hypopyon was present. No light perception. Eyeball sensitive to touch. The pupil had showed no response to the atropia. Traumatic irido-cyclitis. This condition became progressively worse; panophthalmitis in four days. On the fifth day the eye was enucleated by Dr. Chisolm. I carried it immediately to the Pathological Laboratory of the Johns Hopkins University, where it was at once submitted to a careful bacteriological examination. The surface of an area including a part of the cornea and adjacent sclera was thoroughly burnt by means of a red-hot knife-blade. Through this sterilized area a small opening was made with a hot scalpel, and through the opening was thrust a sterilized platinum oese. With the purulent material withdrawn in this way from the aqueous and vitreous chambers, as well as from the inflamed tissues of the eye, agar and gelatin roll cultures and slanting agar cultures were made. Cover-slip preparations were made. An inoculation was made at the same time into the anterior chamber of a rabbit's eye, into which a small opening was made with a sterilized cataract needle through the cornea, the material for the inoculation consisting of that withdrawn with a platinum needle from the vitreous. The eye was then further opened with a sterilized knife and placed in alcohol for further histological and bacteriological examination. The agar tubes were placed in a thermostat at 36° C., the gelatin at 20° C.

After twenty-four hours the agar cultures had developed, showing a large number of grayish-white colonies of a short oval bacillus unmixed with any other variety of colony or bacillus. The growth on the slanting agar was diffuse after forty-eight hours. The gelatin roll cultures showed good growth. The roll made directly from the eye was crowded with small gray colonies, which appeared to be a pure culture of the same bacillus already observed in the agar tubes. No liquefying or other contaminating colonies were present. The second dilution showed larger pale, gray, flat colonies having irregular contours. From single colonies inoculations were made into various culture media, and the bacillus was studied in all its properties for purposes of identification.

The fully developed surface colonies on nutrient gelatin appear to the naked eye as pale-grayish colonies with bluish translucence, often iridescent by oblique illumination, thin, flat, spread out, with notched irregular contours. They attain a size of 5 to 10 mm., and when far apart may grow even larger. Under a low magnifying power they may or may not show a central darker dot. The rest of the colony is finely granular, often nearly or quite homogeneous at the pale, irregular margin, grayish or pale yellow according to thickness, and often presenting markings in the form of irregular wavy lines, sometimes comparable to the lines representing mountains on a map. The deep colonies are round or oval, yellow or brownish, granular. The gelatin is not liquefied.

The agar colonies resemble those in gelatin. The growth in bouillon is a diffuse cloud, settling later as a sediment. Milk becomes somewhat thickened in twenty-four to forty-eight hours at body temperature, and

in two or three days is firmly coagulated. The blue color of litmus milk becomes pink. On potato the growth is abundant, dirty grayish or pale brown, with some gas-formation.

The bacillus in eighteen to twenty-four hours agar cultures shows motility, but some only of the bacilli are motile, others do not move. After two to three days there may be no motile bacilli. In sugar (glucose) bouillon in Einhorn bulbs, gas is produced measuring 2 to 3 ctm. on the scale. Gas is also formed in agar to which glucose has been added. The bacilli, therefore, ferments both glucose and lactose. The bacillus is a short oval bacillus varying somewhat in length, but averaging but 2 to 3 μ . It is rather plump. It is decolorized by Gram's stain, but stains readily with the ordinary aniline dyes. The characters described identify this bacillus as the bacillus coli communis or at least as a member of the group of bacilli included under this name. It was cultivated and studied side by side with a culture of a colon bacillus obtained from healthy feces, and was found to correspond in all morphological and cultural characters to the latter.

Microscopical sections through the hardened eye showed an extensive accumulation of polynuclear leucocytes in the vitreous and infiltration of the choroid and iris with the same cells. Sections stained with Löffler's methylene-blue and with aqueous solutions of gentian-violet showed in the purulent exudate, in considerable numbers, short oval bacilli, often in small clumps, and apparently identical with those observed in the cultures. They were mostly, if not entirely, extra-cellular in situation. No cocci or other species of organism could be detected.

The rabbit's eye which was inoculated directly with a small quantity of purulent exudate from the fresh enucleated eye, showed at the end of twenty-four hours opaque infiltration of the cornea extending a considerable distance from the inoculation wound, some opaque pus on the anterior chamber, hyperæmia and infiltration of the iris, with irregularity of the pupil on the side next to the inoculation, and intense conjunctivitis. The next day the inflammation reached its acme; the pupil was entirely bridged over with a filmy opaque exudation, and there was much pus in the anterior chamber. The opacity of the cornea had extended. Cover-slip preparations from the exudate showed in large numbers and in pure culture the colon bacilli.

In the course of three weeks the inflammation cleared up, leaving a dense opacity of the cornea near the site of inoculation. Several inoculations were subsequently made in rabbits' and dogs' eyes with pure cultures of the bacillus obtained from the enucleated eye of the boy. They were made by carrying into the anterior chamber through a small opening made with a sterilized instrument at the sclero-corneal edge a small quantity of the culture on a platinum needle. In every instance when the inoculation was made into the anterior chamber there resulted a severe conjunctivitis, keratitis, hypopyon, and irido-cyclitis such as has been described, with subsequent subsidence of the inflammation, leaving only partial, often slight, opacity of a part of the cornea. It is interesting to note how rapidly such intense inflammations subside in the eyes of rabbits and dogs, whereas a similar condition in the human eye would ultimately result in loss of function in the majority of cases. When, however, the inoculation was made into the vitreous destructive panophthalmitis resulted.

I injected two drops of a thin suspension in physiological salt solution

of a twenty-four hour agar culture of the bacillus into the vitreous humor of a rabbit by means of a sterilized hypodermic syringe. I made the injection at a point about midway between the papilla and posterior surface of the lens. The primary effect of this injection was simply a slight disturbance in the transparency of the vitreous in its upper part as discerned with the ophthalmoscope. After twenty-four hours the media were so cloudy that the fundus could not be seen. After forty-eight hours the pupil was blocked up with a thick yellowish white exudate, and the anterior chamber was half-full of pus. Chemosis and great injection of the conjunctiva were present. There were all the signs of acute panophthalmitis. The eye subsequently underwent slow degeneration and atrophy.

It is evident from these experiments that the colon bacillus isolated from the enucleated eye is possessed of marked pathogenic power, and is capable of setting up purulent inflammation of the eye, such as was observed in the case of the boy. Inasmuch as this bacillus was present in pure culture, we feel justified, in the light of the bacteriological examination and of our experiments, in regarding it as the specific cause of the inflammation in the boy's eye.

Three ways suggest themselves as possible explanations of the mode of entrance of this bacillus into the eye: 1. With the foreign body. 2. Later, into the wound. 3. By the circulation. As regards the last explanation, it is to be said that the colon bacillus has the power of entering the circulation, and of being carried to distant organs, in case of some lesion of the intestinal mucous membrane. In the present instance the bacillus might find a *locus minoris resistentiæ* in the injured eye. But there was no evidence of any lesion of the intestine, and we regard this explanation as very improbable. We consider, therefore, that the bacillus got into the eye in one of the first two ways mentioned.

The colon bacillus is a normal inhabitant of the intestine, making up no small part of the feces. It is evident that it can be widely distributed outside of the body, and it has been found in water and in the ground, especially under circumstances when these could become contaminated with intestinal discharges.

The bacillus coli communis was first described fully by Escherich, in 1885, who regarded it as capable of causing intoxication by its products, but not as an infectious organism. The first observation suggesting that it might possess infectious properties was made by Tavel,¹ in 1889. The next observation was made by Welch,² in 1890.

Welch was the first to demonstrate that this bacillus is a common invader of the body in cases with lesions of the intestines. This interesting bacillus has now been found by many observers in a variety of

¹ Correspondenzbl. f. Schweizer Aerzte, 1889, No. 3.

² The Medical News, 1890, vol. i. p. 566. Ibid., 1891, vol. ii. p. 669. Also, Bulletin of the Johns Hopkins Hospital, July, 1891, and Trans. of the Cong. of Amer. Phys. and Surg., 1891, vol. ii.

affections, the most common being peritonitis, angiocholitis, and cholecystitis. It appears to vary very much in virulence and pathogenic power. The case reported in this paper is the first one, to my knowledge, in which this organism has been found in affections of the eye, and it therefore has seemed worthy of record. And here let me thank Professor Welch, Director of the Pathological Laboratory, for the interest he has taken in these experiments and for the many helpful suggestions he has made to me while preparing this report.

A CASE OF SO-CALLED PSEUDO-MYXOMA PERITONEI, WITH OBSERVATIONS ON THE FORMATION OF HYALIN.

BY HENRY W. BETTMANN, M.D.,
OF CINCINNATI, OHIO.

IT was not very long ago that cysts of the ovary other than carcinomatous and sarcomatous were universally considered to be benign growths, incapable of infecting neighboring organs, and never causing relapses after removal. Baker Brown (1) was the first to report a case of infection of the peritoneum and relapse after removal of a simple papillomatous cyst of the ovary; and after attention was once called to the subject similar cases multiplied rapidly in medical literature. Papillomatous cysts were soon universally recognized to be, on the one hand, very liable to carcinomatous degeneration, and, on the other, very prone to transplant themselves upon the peritoneum. For this reason papilla-bearing cysts were separated from simple glandular cystomata, and assumed a position of their own. Some interesting details of this subject are given by Coblentz (2). During the past twenty years observations have multiplied to show that even the simple glandular proliferous cystomata are not in all cases incapable of infecting the peritoneum and producing symptoms of a malignant type. Atlee (6) was the first to report two cases where ovarian cysts produced curious changes of the peritoneum, the same being covered with an adherent jelly-like mass. Beinlich (3) followed with two similar cases in 1874, describing them in full and mentioning a third. These reports were followed rapidly by others. The general features of all the cases were alike. Women, usually over forty years of age, were affected with rapidly growing ovarian cysts. The cysts during operation were found to be very thin-walled; often to have ruptured in one or more places. The contents were thick, gelatinous, and, what is characteristic, the whole peritoneal surface was found coated with a layer of gelatinous substance, 2 mm. to 2 cm. thick, and which could not be removed. As a rule the operations resulted fatally, usually without symptoms of

peritonitis. The reader is referred to the bibliography for a complete chronological history up to date of the cases reported. The pathology of the subject was first elucidated by Werth (11), who demonstrated that in all cases previously reported the outpoured cyst contents remained passive and became attached to the peritoneum by inflammatory processes in the latter. Donat (15) verified the statement of Werth, and suggested the term "foreign-body peritonitis." But not all cases reported were of a similar character. In these the jelly-like coating of the peritoneum was not the only pathological condition found, but cysts similar to the original ovarian one had developed in various parts of the peritoneal cavity. Thornton's (5) case was the first, then followed others by Colrat (7), Baumgarten (12)—three cases, Olshausen (17)—two cases, Schlegtendal (20), Netzel (10), and Runge (18). The behavior of the outpoured cyst-contents constitutes the chief distinction between the two classes of cases. In the first class the contents remain passive; in the second they are active—epithelial elements become fixed in the peritoneum and multiply, forming the new cysts. Olshausen's (17) case No. I. is very interesting in this connection. Epithelium was evidently transplanted, but did not succeed in forming cystic growths; it covered fibrous septa arising from the peritoneum, and, by secreting profusely, filled the abdominal cavity with gelatinous contents. This case occupies a position between the two classes. The definite separation of true transplantation on the one hand, and peritoneal reaction against outpoured cyst-contents (pseudo-myxoma, Werth) on the other, I find nowhere in the literature referred to. It is an advance in the pathology of the subject to keep such distinction clear.

Another point not brought out by former authors is the great rapidity of growth which such tumors display. Definite statements concerning rapidity of growth are made in nine cases. In two (Baumgarten, Schlegtendal) the growth was slow. In the other seven the time between first symptoms and the operations varied between several weeks (!) (Korn, case operated by Leopold) and eight months, Werth's case being operated on four months after first symptoms, Runge's and one of Beinlich's five months. The high mortality has been referred to by all writers. Netzel thinks that early operation will lower the death-rate, but it seems that the operations as a rule were not delayed too long. Of the thirty-five cases so far reported, eighteen recovered, fourteen died, and in three the outcome was not stated.¹

The case which I here report occurred in the hospital practice of

¹ Since writing the above I have found an additional case reported by Strassmann, in the *Zeitschr. f. Geburtsh. u. Gyn.*, 1891, S. 318. His patient died on the seventh day, of heart weakness. E. Fränkel describes a case in the *Jahresbericht d. Schles. Gesellschaft f. Vaterl. Kult.*, 1891, lxviii. 68-70, but I could not refer to the original. J. Oliver, in the *Liverpool Med.-Chir. Journal*, 1891, xi. 266-68, reports the rupture of a cyst with colloid contents: original also not obtainable.

Prof. Pawlik. A cystic tumor of the ovary was removed from a woman aged sixty-five. The abdominal cavity was found filled with gelatinous masses. Peritonitis developed and the woman died. The body was brought to the pathological laboratory of the Bohemian University of Prague. The autopsy was made by Prof. Obrzut. Through his kindness I was afforded opportunity of studying the case microscopically, and for this and other friendly service I take pleasure in here expressing my thanks.

Autopsy. Body of medium height; mesogastrium distended; a scar extends in median line from the umbilicus nearly to the symphysis. Basilar ganglia of brain and cerebellum somewhat œdematous. In the abdominal and pelvic cavities a large quantity of fibro-purulent exudation. Intestines distended; serosa injected. Omentum majus thickened, covered with diffuse gelatinous mass which also coats the root of the mesentery. Parietal peritoneum thickened, pigmented, and covered with many nodular gelatinous masses. Spleen and liver enlarged and soft. Stone in pelvis of right kidney. Gelatinous masses cover all the viscera of the true pelvis. Remaining ovary small, fibrous. *Pathological anatomical diagnosis:* Myxadenoma ovarii dextri extirpatum per laparotomiam; peritonitis chronica adhæsiva et purulenta acuta; myxoma peritonei; urolithiasis; sepsis.

It will be seen that, aside from the acute peritonitis, the post-mortem revealed the usual conditions—gelatinous masses covering all the abdominal and pelvic viscera. It was not until the gelatinous coating was subjected to microscopical examination that the case excited more than usual interest. The examination showed the case to possess several unique features which led Prof. Obrzut to preserve the specimens for closer detailed description. The specimens were fixed with bichloride and hardened in alcohol. On macroscopic section the cut surface showed the gelatinous masses to be composed of two quite different constituents. One part appeared gray, did not harden thoroughly, and presented a somewhat meshy appearance. The other was dense white; lay imbedded in the first, crossing it in all directions in strips and plaques without definite arrangement. Microscopical examination showed these constituents to be totally different in structure. The gray meshy part was quite simple, consisting entirely of fat tissue and myxomatous tissue; these are arranged with no definite relation to each other; fat cells are found imbedded among the stellate cells of the mucoid tissue; patches of true fatty tissue are found, but the major part is mucoid tissue. It is impossible to infer which of these tissues is primary, or which, if either, is derived from the other. A stroma is recognizable only here and there, and consists of fine fibrils, probably mucin precipitated by the bichloride or alcohol. Staining with picrocarmine or gentian-violet brings out the stroma more prominently.

The myxomatous tissue scarcely requires detailed description. The cellular elements are almost entirely the stellate cells characteristic of mucoid tissue. These have round nuclei which stain only lightly; are

possessed of many long processes which form an interlacing network with the processes of neighboring cells. Round cells are scattered about here and there both in the mucoid and fat tissue, but their number is limited. The firm white masses which lie in this mucoid tissue are usually separated from the same by aggregations of leucocytes, which often form a regular border several layers deep, but often are few or wanting. Bloodvessels are quite numerous and often attain large size.

The firm white portions of the gelatinous substance, in unstained sections, are characterized by their shining homogeneous appearance. The substance is not at all affected by acetic acid, by mineral acids, ammonia, or ether. Its appearance, in fact, is strongly suggestive of amyloid, but with iodine it takes on only a pale-yellow tint, and gentian-violet stains it only a faint blue. Eosin stains it very readily; hæmatoxylin also strongly but very slowly; the carmines give it only a yellow tint. These reactions identify the masses as a substance which of late years has borne the name of hyalin. More careful stains and examination with higher powers reveal peculiarities in the structure of these masses. The greater part is composed of a homogeneous substance which takes on all stains quite faintly and diffusely and which allows no structure to be distinguished. Here and there, however, it encloses scattered cells, many of which resemble leucocytes, others being large and oval in shape. Recognizable here and there in the masses are larger and smaller lakes of blood, the red blood-corpuscles having more or less perfectly retained their normal character. Aside from the homogeneous mass are more fibrinous parts, which form coarse and fine trabeculæ. Both the homogeneous and the trabecular parts are found on nearer examination to be permeated in all directions by minute canals and holes which follow no definite course, often anastomosing with one another, often lying isolated. These minute canals have no walls of their own, being bounded simply by the hyaline masses in which they lie. Often the canals are empty, but usually they contain round nuclei which stain deeply. The canals on cross section look like holes, are usually round, and the contained nuclei often completely fill the lumen. We now see what we originally termed hyalin is really identical with what Langhans (29) described under the name of canalized fibrin, a term which has been generally adopted.

The examination thus far made gives our case of so-called pseudomyxoma a unique character, neither true mucoid tissue nor hyaline substance having been found in any previously described case. Our task is now, by use of finer section and more careful stains, to explain the origin and significance of these tissues. As an introduction to the study of the hyaline masses I determined to read what other observers had written on the subject. I was astonished to find a very large literature in this field, and a variance of opinion among authors such as

is met with in few other topics in pathology. An outline of the history of hyalin and of the various theories and observations concerning its origin may here be of interest.

The recognition of hyalin as a definite morphological substance belongs to modern pathology. It was seen often enough by the older pathologists, but as long as the ideas concerning the colloid metamorphoses in general were so obscure the substance could not be definitely separated from the colloids. Virchow (64) himself says that what in former writings (65) he called "sclerosis" and "atrophic hardening" of tissues is probably identical with what to-day goes by the name of hyalin. Rokitansky (66) in 1849 and 1859 noted hyaline changes in cerebral vessels and described the appearances presented. Billroth (25) described the same conditions. The next observers of hyaline degeneration of cerebral vessels were Wedl, 1863; Arndt (26), Schüle (60), 1868. Arndt gave Thiersch (24) the credit of having first definitely applied the term hyalin to this substance. To Langhans (29) we owe the first full description of at least the morphological properties of hyalin. This he found on the maternal side of the chorions of fully developed placenta, and gave it the name "canalized fibrin." Grancher (28) and Schueppel (27) had probably had the same substance under observation, the first in cheesy foci in the lungs, the second in tubercles of lymph glands. Schultz (30) described hyaline substances in white thrombi resulting at the seat of wounds in arteries. To Recklinghausen (31) is unquestionably due the credit of giving hyalin a definite place in pathology. He not only collected all past literature bearing on the subject, but also investigated the subject from all possible standpoints—chemical, morphological, micro-chemical, and etiological. He showed how widely scattered it is in the human system and under how many varied pathological conditions it arises. He showed its relation to amyloid, and suggested that the two substances represent different stages of the same process. He suggested also that there may be transition forms between fibrin and hyalin. Hyalin itself, he says, has its source in the protoplasm of cellular elements, which may or may not take up new elements from the blood to form the hyalin. The cells lose their nuclei and fuse together. In extravasations he thinks the hyalin arises from leucocytes and at times from endothelial cells.

Since Recklinghausen's publication in 1883, nothing has been added to the morphology or chemistry of hyalin, though the attention devoted to the subject has been very great. Chief interest centres upon the origin of hyalin. Some writers, such as Schaeffer (56) believe hyalin to be always a derivative of coagulated products or fibrin, and deny to hyalin an independent existence. Others find the most varying sources for hyalin. Thus Peters (34) ascribes the formation of hyalin about the vessels of tissues affected with diphtheria to the degeneration of

leucocytes, but the hyalin in the membrane itself to pus cells, the epithelium, and the preformed connective-tissue cells of the part. Weigert (37) believes the source of hyalin to be the products of coagulation, either fibrin or, when occurring in cells, the product of coagulation-necrosis. Others, again, such as Neumann (39) and Vossius (38*b*), find the changes only in the intercellular substance of connective tissue, the cells being passive and atrophying under the growing pressure.

There is not only no lack of views as to the origin of hyalin in different tissues, but even in the study of the same organs most varying conclusions have been reached. Hyaline changes have been studied most in tubercles, and in the conjunctiva, and the vessels of the brain. Wieger (32) thinks the hyalin of tubercles arises from degeneration and fusion of epithelioid cells. Vallat (36) studied especially the tubercles of the spleen and lymph glands. According to him, hyalin has different sources in different forms of tubercle. In one form hyalin is derived from the reticulum of the peripheral zone of the tubercle; sometimes directly from the reticulum of the spleen and lymph glands. In others, the epithelioid cells are transformed directly into homogeneous flakes without nuclei. Arnold (35) agrees in the main with Wieger. It is difficult, however, to see the consistency of his conclusions. The epithelioid cells he describes as staining intensely with eosin, the hyaline masses little or not at all.

The hyaline changes in the conjunctiva have a literature of their own. Here it is that most frequently a direct relation has been found between amyloid and hyalin, the two substances often lying side by side. Raehlmann (40) believes that amyloid of the conjunctiva is always preceded by a hyaline stage. Wild (59), in studying a case of widespread hyaline degeneration comes to the same conclusion. Reymond (47) was the first to describe hyaline changes in the eye. Raehlmann states that the hyaline changes are always limited at first to the cells of the adenoid tissue of the conjunctiva. Wagenmann (42) reports three cases of hyaline degeneration about the lenticular capsule. He believes the hyalin to be derived from the capsular epithelium, possibly in one case from the endothelium of Descemet's membrane. Poriwaeio (41) found amyloid and hyalin side by side in the same conjunctival growth. Kamocki (43) in two cases, and Vossius (38) in three, could find no transition form between hyalin and amyloid. The former believed the cells of the adenoid tissue to be the source of the hyalin, the latter the intercellular substance of the same. Oeller (45) found about one-tenth of the capillaries of the chorio-capillaris hyaline in a case of lead-poisoning. He noted numerous hemorrhages between perithelium and endothelium, and saw clearly the gradual change from red blood-corpuscles into homogeneous masses and hyalin, and this not only in the perivascular spaces, but also in the lumina of the capillaries and arterioles.

Turning to the bloodvessels we find the same diversity of opinion. Wiegner and Holschewnikoff (49) believe the hyalin to result here from transformation of a cellular infiltration of the vessel wall. Ziegler and Vossius think the vessel wall is swollen by a protoplasmic exudation which coagulates. Neelsen (48) believes that endothelial cells form the hyalin. Interesting observations have been made on the formation of hyalin in the kidney by Obrzut (50). He here found the hyaline substance in the capillaries of the glomeruli, around the canaliculi, and in the inner surface of the capsule of Bowman, to be derived directly from all the corpuscular constituents of the blood. A direct transition from blood corpuscles into hyalin was clearly seen and illustrated.

Sections of our new growth were subjected to the most varying staining processes, iodine, safranin, picrocarmine, borax-carmine, hæmatoxylin, eosin, vesuvin, and Weigert's fibrin method (37c), besides combinations of the different stains. The most instructive preparations were obtained by allowing the sections to remain twenty-four hours in a dilute solution of hæmatoxylin and then counter-staining with eosin. This method has the advantage of staining fibrin very regularly and clearly, so that even small fibres stand out very distinctly—sometimes with as much clearness as with Weigert's method. In the perfectly homogeneous parts of the section it was impossible even with highest powers (Leitz oil immersion $\frac{1}{12}$, oc. 3), to recognize any structure. Evidently any effort to trace here the histogenesis of the tissues would be fruitless, as evidently these homogeneous masses represented the oldest stages and most advanced changes of the process, whatever it may be. Turning next to those parts where blood lay more or less unaltered in the tissues: here the changes would probably be fewest and most easy to follow. The result was not disappointing. Imbedded in the blood was quite a quantity of fibrin; this appeared in some places in fine fibrils, in others it formed coarser meshes and trabeculæ. It was by following the fibrin to and over the margins of the blood-lakes that clear light was thrown at least upon one source of the hyaline masses. It could be seen without possibility of mistake, that the fibrin went over continuously into the hyaline masses, losing its fibrillar character more and more, and finally assuming all the characteristics of hyalin. Recklinghausen says that we are often unable to distinguish fibrin from hyalin, unless we cling unconditionally to the idea that fibrin presents a fibrillar structure. Here we are forced to the conviction that hyalin is simply a stage in the degeneration of fibrin, that the fibrin becomes more compact, and, through some chemical change, assumes a diffuse homogeneous appearance. The same gradual transition from fibrin into hyalin is seen in various conditions. It can be seen exquisitely in some cases of endocarditis verrucosa. Meyer (33) describes it in the walls of aneurisms in phthisical cavities, Takács (63) in a case of multiple

neuroma. Weigert (37*a*) says the fibrin of serous inflammations nearly always becomes hyaline. Hanau (57) saw fibrin and blood-plates change into hyalin in white thrombi. Virchow (62) states that the thrombi in the pulmonary arteries of dogs usually becomes hyaline between the second and seventh day. Dreyfuss (54) describes two forms of hyalin around the milk ducts, one homogeneous, the other fibrillar, the two being directly continuous. There can be no doubt that fibrin and hyalin are slightly altered conditions of the same substance, and that fibrin passes very readily and frequently into a hyaline condition. The present observation is but an addition to what has by this time become a strong chain of proof.

But not all the hyalin in the present case can be derived from fibrin; at least this cannot be demonstrated by observation, and the amount of fibrin seems by far too small to produce so large a quantity of hyaline substance. It is here, again, that reference to the blood-lakes gives a solution to the question. The blood in the middle of the lakes is quite unchanged; in some cases the whole lake presents quite a normal appearance, the red corpuscles having taken on a rosy-red eosin stain, and being separated from the surrounding tissue, either abruptly or by a thin layer of fibrin. In other parts it was very instructive to study the margins of these blood-lakes. Instead of stopping abruptly, the red blood-corpuscles went over quite gradually into the surrounding hyaline masses, becoming more and more crowded together, their outlines becoming more and more hazy, until they were quite lost in the hyaline mass. Here, a direct transition from red corpuscles into hyalin, such as seen by Oeller in the chorio-capillaris, can be inferred. Further proof of this conclusion can be obtained by using intense eosin stains. As in the case of Oeller, one is here surprised to find the outlines of red corpuscles in places which, by other staining methods, looked trabecular or homogeneous. The same observation can be made after careful staining with Weigert's method. In patches, homogeneous under low powers, the outlines of red blood-corpuscles can here and there be seen more or less dimly with the aid of the immersion lens. We are almost forced to the conclusion that hyalin is here the result of degenerative processes in the red blood-corpuscles. This supposition also finds support in other parts of the body; in fortunate specimens of endocardial thrombi this transition can be seen, also in the canalized fibrin of the chorion; and is mentioned besides in the cases of Oeller, Takács, and Obrzut.

The number of writers who have called special attention to the direct transformation of red blood-corpuscles into hyalin is few; yet it is impossible to read carefully the literature of hyalin without coming to the conclusion that such transformation has often enough been seen, but has been usually wrongly interpreted. Holschewnikoff describes hyaline

changes in cerebral vessels. Often he found veins wholly choked up with hyaline masses which stained very faintly with hæmatoxylin, eosin or gentian-violet. It is natural to consider the hyalin here as altered blood. He quotes Kolessnikoff, who also found hyaline masses filling up the vessel lumina. Schüle, describing "flaky degeneration" of cerebral vessels, finds lumina choked up with the flaky masses. Adler (61) also describes highly refracting masses choking cerebral arterioles. He considers them a post-mortem deposit from the blood plasma. More convincing observations which seemed to have escaped correct interpretation have been given us by Kriege (55). I may be pardoned for quoting from him more fully. He froze rabbits' ears by means of the ether spray and subjected the ears to microscopic investigation after varying intervals of time. After two hours' interval he found the bloodvessels dilated and filled with blood; *the blood column in the dilated vessels was interrupted here and there by finely granular thrombi*; examined after twenty-four hours the vessel walls were absolutely unaltered, *but the thrombi had undergone hyaline degeneration*. Here the connexus seems clear, yet Kriege mentions only the possibility of white corpuscles giving rise to the hyalin. Examining ears after two days' interval, he found some vessels filled with hyaline trabeculæ; in large vessels fibrinous coagulations bordered directly on the hyaline masses, yet Kriege mentions no possibility of the fibrin having become hyalin. The view, therefore, that hyalin may be a direct product of degenerated red blood-corpuscles seems supported from many sources. Besides having been observed directly by Langhans, Oeller, Takács, Obrzut, and myself, the process is made probable by observations of Holschewnikoff, Kolessnikoff, Schüle, Adler, and Kriege. The difficulty in the recognition of such origin is the fact that, with age, hyalin becomes more and more homogeneous and stains more and more imperfectly.

Turning our attention from the hyaline part of our new growth to the mucoid part, we are met with even greater difficulties regarding the histogenesis. We are seriously handicapped by two facts: the obscurity relating to the origin of myxomata in general, and the fact that the original ovarian cyst was not preserved for more careful examination. The existence of primary myxoma of the ovary is doubtful. Olshausen states (67) that so far no case has been demonstrated. Cohn (68) collected one hundred cases of malignant tumors of the ovary from Schroeder's clinic, and included three under the name of myxoma, without stating, however, what he meant by the term. Hjelt (69) also reported a thirty-pound myxoma of the ovary, but the review in the *Jahresbericht* failed to give histological details. Myxoma of the ovary secondary to carcinoma has been reported recently by Griffith (70), and secondary to endothelioma by Von Velits (71). Primary myxoma of the peritoneum, though very rare, undoubtedly occurs. The oldest re-

ported cases are by Waldeyer and Ritter (73), more recent cases by Eve (74), Madelung (75), and Langer (76). Terillon (77) collected altogether sixteen cases, and describes a case in a male; but our own case finds no light from the cases previously reported, and we are compelled to seek conclusions in the growth itself. The closest study of the relations between the fibrinous and the mucoid structures on the one hand and the mucoid and fatty on the other, fails to make the origin of the mucoid tissue clear. We find the three different tissues mixed up without the slightest show of special arrangement. Part of our new growth we know to be the product of a bloody effusion. Is it not possible to refer the mucoid tissue to the same source?

The cases in which myxomata have arisen after traumata, or in connection with exudations or hemorrhages, are not few, and often a direct histogenetic relation may be traced. A few cases may be quoted.

Burreli (78) mentions the case of a man who after a severe blow on the head developed chronic headache and convulsions. Autopsy after several months revealed ten myxomata in the brain, two of which lay between the pia and arachnoid. The same case had three minute myxomata in the kidneys. Elben (79) describes a case still more suggestive. A boy, aged five, was severely injured and died after several months. Autopsy revealed a thirteen-pound hemorrhagic myxoma springing from the peri-renal fat. Elben believes the myxoma to have arisen from the hemorrhage around the kidney. Passavant (80) ascribed a myxomatous neuroma to an exudation, rich in fibrin, between the nerve fibres. Arnold (81) described minutely a myxo-sarcoma of the pia mater. He believed the mucoid tissue developed out of the granulation tissue, the cells assuming spindle and stellate forms, and the intercellular substance degenerating. Those cases are also of importance where myxomata develop within the circulatory system. Breus (91) cites the case of a man, aged forty, where a myxoma developed within the venous system from the testicle to the heart. Examples of pure myxomata developing in the left auricle of the heart have been described by Bamberger (82), Wiegand (83), Salvioli (84), Virchow (85), and Boström (86), and though here the origin was ascribed to the connective tissue of the endocardium, origin from thrombi is not altogether improbable. Recklinghausen (87) described a myxoma in the base of the tongue in a case of ranula. The myxoma was separated from the lingual tissue on one side by an intensely white and opaque substance (fibrin?) and on the other by hemorrhagic infiltrations.

When direct observation fails we are compelled to resort to theory. It seems not improbable that in many of the just mentioned cases myxomatous tissue arises directly from degeneration or other changes in plasmatic exudations or blood-corpuscles. This process seems the most probable one in our case of pseudo-myxoma. Effused blood is found

unchanged; here and there it has lost its normal condition, the corpuscles being no longer clearly defined: in other places degeneration has proceeded further: the corpuscles have fused together into hyaline masses which stain heavily with eosin and hæmatoxylin. Still older parts have become perfectly homogeneous and take up no stain well. It were but another step to change into a perfectly unstainable transparent ground substance of mucoid tissue. As to the origin of the stellate and fat cells we have no clue. We may believe that they are the changed leucocytes, but there is no proof in favor of such a view.

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REVIEWS.

MANUAL OF CHEMISTRY. A GUIDE TO LECTURES AND LABORATORY WORK FOR BEGINNERS IN CHEMISTRY. A Text-book specially adapted for Students of Pharmacy and Medicine. By W. SIMON, Ph.D., M.D., Professor of Chemistry and Toxicology in the College of Physicians and Surgeons, Baltimore, and Professor of Chemistry in the Maryland College of Pharmacy. New (fourth) edition. 8vo., pp. 490. Philadelphia: Lea Brothers & Co., 1893.

A BOOK which, like Professor Simon's work before us, has gone so rapidly through four editions scarcely needs comment, for both students and teachers must have decided in its favor and endorsed its methods and contents. The distinguishing feature of this book consists in the excellent colored plates by which color reactions and precipitates are illustrated. This is not alone unique, but is also a laudable endeavor to impress the student with landmarks in his course on chemistry.

The more uniform system of orthography and nomenclature for chemical terms, as proposed by the American Association for the Advancement of Science, has not been fully adopted in this work, and perhaps wisely so. Such changes in text-books must be gradual, as the teacher and student will only in time arrive at that standard. Reforms in this direction are subject to evolution, and usage as well as habits cannot be broken abruptly by everyone without impairment of the usefulness of teaching.

As much may be said of the periodic classification of the elements, and though this should probably best appear side by side with the older system of classification for some time to come, yet the change should be made as one that becomes necessary for our adaptation to modern methods of study. It was some time before we could drop the incubus of organic chemistry, but the general adoption of the study of the carbon compounds in its stead has by this time, even among physicians, been arrived at.

The analytical processes of the fifth part are given with much clearness and deserve favorable mention, though some processes might have been added to advantage here. Thus the Volhard's method of determining silver with ammonium sulpho-cyanide should have appeared amongst the volumetric methods.

The part dealing with the consideration of the carbon compounds shows careful elaboration, and the experience of the teacher is clearly indicated by the stress laid on leading points. The arrangement of the haloid ethers amongst and after the aldehydes is, by way of proper sequence in the substitution of the hydrocarbons, somewhat objectionable; although for medical and pharmaceutical purposes they might perhaps be so arranged. The plate illustrating the color reactions of the

alkaloids is brilliant and realistic, and the completeness of the alkaloidal reactions make this part of great value to the student of pharmacy and toxicology.

The ptomaines, leukomaines, and toxalbumins appear also in this part, together with the proteids, and form a material improvement. By far the greatest advancement has been made in Part VII., on Physiological Chemistry. Here the Chemistry of Foods, of Nutrition, Digestion, Assimilation, Respiration, together with the fluids of the body, is treated in a happy manner.

The addition of the Chemistry of the Gastric Secretions is especially commendable. The study of the Milk is fully entered upon, as well as that of the Urine. The latter especially is enhanced, and the color reactions in Urinalysis as illustrated here are beautifully represented and must prove highly instructive.

Prof. Simon's work is no doubt now one of the best text-books on chemistry for the students of medicine and pharmacy. L. W.

MANUAL OF PRACTICAL MEDICAL AND PHYSIOLOGICAL CHEMISTRY. By CHARLES E. PELLEW, E.M., Demonstrator of Physics and Chemistry in the College of Physicians and Surgeons (Medical Department of Columbia College), etc. New York: D. Appleton & Co., 1892.

IN the preface to this book the author states that he has interrogated and visited the leading medical schools, both abroad and in this country, to determine a course of practical chemical instruction to be adopted. He claims that in every case where the practical instruction given was more than merely urine analysis, with sometimes a little toxicology, it consisted of a regular course of qualitative and perhaps some quantitative analysis.

This course was rejected by him as being too chemical and too little medical, and his work originated with the purpose of overcoming these defects. To this, first of all, we must take exception. From our personal knowledge of chemical teaching in the principal colleges of this country such is not uniformly the case. The student usually is little prepared in chemistry when he enters upon his medical studies, and to take up toxicology and physiological chemistry he must first be taught the principles of practical work in a chemical laboratory.

In all the colleges which give a three or four years' course the first year's practical study is usually employed in "qualitative" and also some "quantitative" work as applied to poisons, their reactions, detection, and determination. Otherwise the course of chemistry would certainly be deficient of a material part, and where such studies could be made except in the chemical laboratory is not apparent. Either the author has to deal with advanced students only, or he ignores a part of the medical curriculum lacking which no physician could be considered safe or efficient.

If the book is intended for advanced students of medicine and practitioners, it certainly deals with matters of great importance for them. As a practical study in the Chemistry of the Carbon Compounds the book gives to each subject first an explanation in a brief and clear

manner, following this with directions for laboratory experiments in the manner found in other text-books on physiological and pathological chemistry (such as T. Cranstoun Charles, etc.). Part I. treats of the Carbohydrates and their derivatives; Part II., the Fats, illustrating the formation of soaps, of glycerin, and the distinctive tests for butter and oleomargarine; Part III. treats of the Proteids, their classification and reaction. The inorganic constituents of the body are taken up in Part IV., dealing with oxygen, hydrogen, chlorine, also hydrochloric, sulphuric, carbonic, nitric, and phosphoric acids. Iron, aluminium, calcium, magnesium, are here considered, also the alkaline metals. Part V. is devoted to Water Analysis, and we note with satisfaction that the bacteriological test is given here, besides the chemical tests for free and albumoid ammonia, the nitrites, nitrates, and the test for hardness.

The Animal Tissues and Secretions, Part VI., comprises the chemistry of bone and especially of milk, both animal and human, and its preparations. The portion relating to milk-testing deserves special mention for its completeness and detail, in particular as refers to breast milk. The chemistry of the blood is here also considered, and given along with its microscopy and spectroscopy usually taught in physiological laboratories.

Part VII. treats on Digestion, and embraces the clinical tests of the gastric juice by Dr. Kinnicutt. This is given in accordance with modern researches on the subject, and it is only to be regretted that the author did not also add a quantitative test for hydrochloric acid in the gastric juice, as without this all gastric chemical diagnosis is largely guess-work.

In Part VIII. the chemistry of the urine is well treated, though we cannot see why the quantitative determination of uric acid either by Haycraft's or Ludwig's methods is not given, for only by its quantity can it be shown to have diagnostic bearing or pathological importance. In the determination of sugar in the urine, the most practical and perhaps the only reliable quantitative method, by the polariscope, is not given. Part IX. on the microscopical examination of the urine is complete, and is illustrated by beautiful colored plates. The introduction of the centrifugal apparatus for separating urinary sediments is commendable.

As a manual and guide for practical work in physiological chemistry, this work deserves favorable mention. While we cannot consider that it covers the entire ground of chemical studies requisite for a medical course, it will prove a valuable addition to the library of the advanced medical student and practitioner of medicine.

L. W.

TRAITÉ DE CHIRURGIE DE GUERRE. Par E. DELORME. Tome II. 8vo., pp. 1018. Paris: Felix Alcan, 1893.

MILITARY SURGERY. By E. DELORME. Vol. II.

THE first essential of a good book is a good text; the second a good index. We know of nothing in which the French almost uniformly fail so much as in the latter. The present work, consisting of two large volumes, has at the end of the second volume a meagre table of contents, and absolutely *no index whatever*. At least two-thirds of the value of the book is therefore lost; for if one wishes to discover what the author says about any particular topic which may be alluded to in several parts

of the book, he must laboriously hunt it up first in the table of contents and then by turning over leaf after leaf of the text. If the French would but imitate in this respect the American, English, and German medical books, it would be an immense gain and would make their literature much more accessible to readers. It is often neglected and left unquoted by reason of this fault and of its diffuseness.

The present volume deals with lesions of bones and joints and amputations. These are followed by nineteen chapters considering the lesions of as many different regions of the body, and covering over six hundred pages. Then follow the consideration of lesions caused by powder and other explosives, and the organization of the medical service in time of war. Next comes a chapter giving the statistics of the loss of life in various wars, and, curiously enough, a rather brief series of "addenda" concerning recent changes in projectiles, complications of gunshot wounds, hemorrhage, foreign bodies, tetanus, malignant oedema, and hospital gangrene. These various addenda cover but thirty pages, and many of the more important, such as hemorrhage, etc., only a page or two. The book, therefore, while very full in many respects, is extremely disappointing in the treatment of these later subjects. In so large a work one has a right to expect the full consideration of such topics, and is put off with a *résumé* so brief as to be practically useless.

Moreover, the book smacks of antiquity in most of its pages. There is too much of Dupuytren and Larrey and too little of modern surgeons, and in many topics it ignores by silence the recent improvements in surgery. For instance, the author's consideration of abscess of the brain is singularly lacking in that precision and clear statement of symptoms which one would expect in a text-book of the present day. Nothing is said as to the subnormal temperature of abscess, and, in fact, his conclusion is that "the symptoms of abscess of the brain are obscure"—and certainly in his statement they are. It is true that he favors immediate trephining in depressed fractures, even if they be simple, and *a fortiori* in compound fractures and in intra-cranial hemorrhage; but this important topic is very imperfectly treated. He refers to Horsley's achievements as "operations hardies," and he fails to give to these operations and to the many that have followed in their wake a due consideration.

In gunshot wounds of the abdomen he mildly approves intervention, but so far as we have seen there is but one reference to Senn, who appears only in a foot-note, as "Seen;" and the whole question of intestinal anastomosis is very inadequately treated. No reference seems to be made to Senn's or Abbe's or other methods of enterorrhaphy or intestinal anastomosis. He approves, however, of nephrectomy in cases of seriously wounded kidneys.

Amputation of the shoulder he advocates in preference, in general, to resection or conservative treatment, and in support of this view quotes the mortality of our Civil War as only 28 per cent. When in doubt as to the character and amount of injury to the shoulder, he very properly advises an incision down to, and even into, the articulation, in order to solve the doubt. His preferential method of amputation is that of Larrey, on account of the ease of arrest of hemorrhage and good drainage. No mention, however, is made of the use of Wyeth's pins, not only in amputation of the shoulder, but even in amputation of the hip. His chief resources for controlling hemorrhage are the older ones,

although in a foot-note (not in the text) the somewhat analogous use of the pins by Trendelenburg and Varick is mentioned. Nothing is said even of Furneaux Jordan's method.

We have singled out these few points as indicative of the general character of the work. If one wishes to find the pathology, history, and detailed description of lesions following gunshot wounds of bones, joints, or different regions of the body, he will find here an ample storehouse; but when it comes to the methodical, systematic statement of symptoms, and especially of treatment, the book is singularly lacking.

W. W. K.

CHOLERA: ITS CAUSES, SYMPTOMS, PATHOLOGY, AND TREATMENT. By ROBERTS BARTHOLOW, M.D., LL.D., Emeritus Professor of Materia Medica, General Therapeutics, and Hygiene in the Jefferson Medical College of Philadelphia. 12mo., pp. 127, with 9 engravings. Philadelphia: Lea Brothers & Co., 1893.

In brief compass, and with his characteristic, clear and forcible style, Dr. Bartholow has expressed in this book the gist of present knowledge regarding cholera.

As would be expected from a veteran therapist, treatment receives ample space and careful attention. Now that the tendency is to minimize the achievements of medicine in contrast with those of operative procedure, we are glad to note that the author finds that progress has been made even in the difficult problem of dealing with cholera. He selects from the experience of others and his own studies in two epidemics those resources proven valuable by trial. Among them we find the administration of calomel in the early stage of the disease; enteroclysis and hypodermatoclysis; the free use of dilute acids, and the hypodermatic use of stimulants selected with reference to the particular need of the individual. When combined with methods of prophylaxis of tried and acknowledged value, these methods of treatment fully justify Dr. Bartholow's belief that substantial progress has been made in the prevention and treatment of cholera.

The book contains illustrations of interest and practical value.

E. P. D.

HYPNOTISM, MESMERISM, AND THE NEW WITCHCRAFT. By ERNEST HART, London. With 20 illustrations, pp. 182. New York: D. Appleton & Co., 1893.

In this small volume Mr. Hart has given medical men a most useful criticism and analysis of a mass of clinical reports and experiences whose peculiar character has commanded wide attention.

Dr. Luys has detailed such extraordinary performances at the Charité that the credulity of his readers has been put to a test in reconciling the accounts given with the carefully observed phenomena of nervous pathology. Mr. Hart shows quite clearly how readily an hysterical,

neurotic individual, when made the subject of frequent experiment, may become a trained and conscious actor of a desired part. Nothing is more deceptive than the apparent success of an experiment or demonstration, and it is not strange that Dr. Luys has yielded to the satisfaction of observing his theories demonstrated and his methods of treatment efficient.

The book should do good to lay readers who are fond of dabbling in quasi-mental science. Humbug is, however, an ever-present, perennial bacillus, and when the present farce has tired the audience another will appear. In America "Christian" Science and Faith-Cure hold the stage at present.

The book contains copies of photographs illustrating the various acts in the performances described. E. P. D.

A TEXT-BOOK OF OPHTHALMOLOGY. By ERNEST FUCHS, M.D. Authorized translation from the second enlarged and improved German edition. By A. DUANE, M.D. New York: D. Appleton & Co., 1893.

It seems hardly necessary to add more words of commendation for this admirable book than have already been accorded by numerous reviewers. We have but rarely indeed read a book with such unmixed satisfaction and profit as this treatise of Professor Fuchs. From cover to cover it is pervaded by a truly scientific spirit. While presenting in a calm and judicial tone the sum of our knowledge up to date, the author has nevertheless succeeded in concealing his own personality behind the facts which he presents and discusses. Although every page reveals the broadest learning and the most careful and painstaking investigation, the book is entirely free from the offensive spirit of the pedant. While due credit is awarded the work of fellow-laborers in the same field, it is nevertheless not a book emanating from the library alone, but everywhere bears evidence of research in the laboratory and clinic-room. Such accurate pictures of pathological conditions could not have been drawn by the pen of one who had not lived, as it were, in the field, with sketch-book in hand. Every experienced surgeon must at once recognize the descriptions of disease and the accompanying symptomatology as true to nature. This is particularly true of the chapters in which are treated the affections of the lids, conjunctiva, and cornea, to which our author has with apparent delight devoted himself.

If any criticism of these chapters is to be recorded it would be on the almost indifferent tone which creeps into the concise but clear sentences when it becomes necessary to relieve or cure the conditions which have been so thoroughly investigated and admirably described.

There are many points in these chapters to which the reviewer would like to call more general attention did space permit; *e. g.*, on page 146, in discussing the etiology of corneal ulcers, the statement is made that "the staphylococcus is always found in the secretion of a conjunctiva affected with catarrh. If now, through a slight traumatism of any sort, the protective epithelial covering of the cornea is injured at some spot, the door is opened for the entrance of cocci into the tissue of the cornea." As in this statement, so throughout the article is great prominence given

to the important rôle played by specific organisms in the causation of inflammatory affections of the eye. Indeed, the complete recognition of the infectious nature of inflammation, and the fact that the disasters following operative procedure are due to like cause, may be said to furnish the keynote of the treatise, and to give to it the admirable harmony which constitutes its charm.

Praise, in almost like measure, may be accorded to the one hundred and twenty pages devoted to the affections of the uveal tract. But even here is noticeable a fact which becomes more apparent as one advances in the book. An increasing brevity of statement, and the general treatment of the subject in hand, leaves the impression upon the reader that allotted space was hampering the writer, or that time forbade the same full, almost encyclopædic treatment which had been so entirely satisfactory in the chapters devoted to the diseases of the external tunics. Here, however, the more serious nature of the affections has stimulated to a greater enthusiasm in advice regarding treatment; and the large experience and excellent judgment in the management of these affections must excite the admiration of everyone who has seen much of the disastrous consequences of the diseases of the chorioid, ciliary body, and iris. The author's recognition of the fact that inflammation confined to one part of the uveal tract rarely or never occurs is worthy of mention, as we believe this is too frequently overlooked in practice. "That the ciliary body is pathologically altered in most cases of apparently simple iritis is put beyond doubt by anatomical investigations." With this statement the reviewer is fully in accord, and believes that were this more generally recognized the great gravity of the disease would be more constantly before the mind of the surgeon.

We were much impressed in reading this chapter by the valuable aid drawn by the author from histology and embryology in elucidating the clinical facts presented by disease of the uveal tract. A notable example of this will be found on page 244, where the teaching of embryology is employed to show that "both the ligamentum pectinatum and its derivative, Descemet's membrane, belong to the uvea. Hence, embryologically speaking, the uvea forms a perfectly closed, hollow sphere, consisting of the chorioid, ciliary body, iris, ligamentum pectinatum, and Descemet's membrane." The importance of this in explaining many clinical facts cannot readily be overstated.

In speaking of the use of mydriatics, the erroneous statement is made, or implied in parenthesis, that *duboisia* and *hyoscyamia* are identical, an implication which will not be accepted by those who have made a careful study of the physiological action of these drugs. Although the chemist may demonstrate their isomeric relation, they are not by any means identical in their physiological properties.

In discussing the enucleation of the eye in sympathetic irritation and inflammation, our author avoids an expression of opinion as to the means of its transmission; but advises early enucleation in sympathetic irritation, in order to avoid the graver conditions to be encountered when the sympathetic ophthalmia has been set up. In the prodromal stages of the latter the offending eye should be removed, since even then the outbreak may be averted. The value of iridectomy in chronic irido-chorioiditis is urged as having a favorable influence over the entire nutritive condition of the eye—a statement the reviewer has had many opportunities to demonstrate as true.

The entire subject of glaucoma is disposed of in a chapter of twenty-eight pages. We cannot but wish that a fuller statement of the author's large experience had been given; certainly for the sake of the student. Nevertheless, in this brief chapter is found a concise review of the present views, in which but little is missed by the attentive reader who has the requisite experience to interpret the brief statements at their true value. The extreme gravity of hemorrhagic glaucoma is stated, and the reason given, viz: that "the hemorrhages are the expression of changes in the vessels or disturbances of circulation." The value of sclerotomy as compared to iridectomy in these cases is not, however, mentioned. We were pleased, however, to see that he throws the weight of his testimony in favor of iridectomy in simple glaucoma. After insisting upon the unconditional necessity for its performance in inflammatory glaucoma, and the permanence of its results, its influence in simple glaucoma is stated as follows: "In glaucoma simplex only the maintenance of the *status quo* is to be counted upon. In a certain number of cases the operation is unsuccessful, or actually does harm. Nevertheless, as without an operation the eye will certainly go blind, iridectomy is indicated in glaucoma simplex, too—at least in those cases in which an evident increase of tension is demonstrable." On page 358 statistics of other observers, and his own experience in thirty-nine cases observed for a mean period of five years, are given to show that in about half of the cases in which iridectomy had been done the success had been permanent. In the light of such experience, the surgeon certainly need not hesitate over the performance of iridectomy in the presence of a malady which will surely prove fatal to vision if left to run its course unmolested.

Passing over the brief but excellent chapters devoted to the study of the diseases of the lens, vitreous body, retina, and optic nerve, and the affections of the eyelids, we come to Chapter XIV., on "Disturbances of Motility of the Eye," to which fifty-seven pages are devoted. We here find one of the most comprehensive, clear, and satisfactory statements of this intricate subject we have seen. Notwithstanding this admirable review of the principles involved, many American readers will be disappointed over the absence of any mention, except in a foot-note by the translator, of the nomenclature of Dr. Stevens and of the measurement and treatment of the heterophorias, to which he has devoted so much study. Insufficiency of the internal recti muscles, in the author's view, seems "the condition which mainly requires consideration," and for this prisms are advised, except in the higher degrees of the trouble, when tenotomy is indicated. No mention is made of the later and more accurate methods of measuring the muscular deviations. The troublesome reflex symptoms attending upon these conditions, as well as upon the errors of refraction, if mentioned at all, are passed over so lightly that the student would not be adequately impressed by their real importance in the routine of practice. This scanty statement must strike the American reader of experience as strange when the entire subject of disturbance of motility is handled in such a masterly manner.

Part III. is devoted to the anomalies of refraction and accommodation, which are disposed of in sixty-seven pages, but the careful reader will not fail to find in them every essential fact stated. The student, however, entering upon this part of his work for the first time would find it difficult to comprehend the real practical importance to his patients of these defects. In a word, if the great clinical importance of the

errors of refraction, accommodation, and of the muscular balance are appreciated by the author, he certainly has not given to them adequate expression in these chapters.

Part IV. is one of the most interesting and useful parts of the book. It is devoted to the operations upon the eyeball and the "adnexa bulbi." For this chapter have been reserved much of the practical detail which the reader misses in the rest of the book. It opens with general remarks upon the importance of the antiseptic method, "which represents the greatest progress made in surgery during recent times." . . . "In operations upon the eye we have less to do with antiseptics than with asepsis; we do not have to disinfect a contaminated wound, but to make a wound that is clean, and keep it from contamination." On page 672 the importance of surgical cleanliness is again stated in the following words: "In former times much more importance was attached than now to the shape and position of the section, especially in cataract operations, the hope of a happy result being based solely upon the proper performance of the section. At the present time we know that the rigorous carrying out of antiseptics in the operation and after-treatment is of much greater significance than the choice of a method of operating. Any section which is of the necessary size, and is suitable in position, gives good results, if in other respects we proceed with the most scrupulous cleanliness." In the after-treatment of cataract the bandage or dressing is to secure protection, all pressure to be carefully avoided. To this end, a pad of cotton is secured over the eye by a single strip of linen, which is fastened to the brow and cheek by adhesive plaster, and injury by contact prevented by a wire screen. "There is no necessity of darkening the room;" direct rays of light, however, are cut off by a screen placed between the patient and the window. It would be a pleasure to direct attention to many of the useful hints which are dropped into this part of the book from the evidently large and well-directed experience of the author, but enough has been said to point out the richness of the feast here provided for the student.

The work of the translator has been done in the most praiseworthy manner, and the publishers have in like manner furnished an admirable example of the high art which can be displayed in the arrangement of type and in the illustration of scientific books.

S. D. R.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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THE THERAPEUTIC USES OF THE NITRITES AND ALLIED COMPOUNDS.

DR. D. J. LEECH believes that it is probable that the nitrites affect more or less all the tissues of the body, but their more distinctive influence is upon the blood and the muscles. In the blood they convert the oxyhæmoglobin into methæmoglobin, and this conversion is connected with a locking up of oxygen in this new compound. It is probable that in contact with living tissues the methæmoglobin is easily changed into oxyhæmoglobin, the nitrite disappearing at the same time, and that the former does not seriously interfere with the power of the blood to nourish the heart muscle. There is no cause to fear the production of methæmoglobin or injury to the blood from the medicinal administration of the nitrites. With regard to skeletal muscle tissue, the nitrite molecule in striated muscular tissue tends to decrease the contractile power and the duration of vitality. On involuntary muscle, both in cold-blooded and warm-blooded animals, the nitrites have a powerful paralyzing effect; this group causes a temporary paresis of the muscular structure contained in the arterial walls, and hence dilatation of the vessels. On the heart muscle the effect is much the same as on the contractile tissues of the vessels. The results of experiments show that the molecules of the nitrite group, in whatever combination, when present in even small quantities, tend to quicken the contractions of the heart, but also to weaken them. If the solutions coming in contact with the heart are very dilute, the quickening may make up for the weakened action, and the heart probably does as much, it may be more, work for a short time. Stronger solutions, after quickening, weaken, slow, and arrest the heart's contractions. But susceptible though the heart is to the influence of nitrites, the evil influence is very evanescent if the nitrite molecule be removed.

On the nervous system their influence is to depress the functions of the

nerve centres and nerves, but not to the extent which might be expected from their influence on the muscles, vessels, and heart. In toxic doses in animals they cause heaviness and apathy; in man, cerebral depression, probably due to their direct influence. In man other symptoms so far predominate that even from toxic doses no distinct indication of an effect on the spinal cord has been noticed. Locally, the nitrites do not have an analgesic effect. As regards the respiration it is believed that medicinal doses tend to stimulate it, or at least so far as the respiratory centre is concerned. The effect upon the pulmonary bloodvessels is not settled, although the author believes that the administration of the nitrites is followed by temporary dilatation of the vessels of the lungs, that the work of the right heart may be relieved by them, and that the good results in dyspnoëic attacks may be the direct result of the relief thus given to the lesser circulation. The effect upon the digestive organs varies greatly: in some individuals they act as gastric irritants, causing sickness and diarrhœa; even if inhaled, the resulting stomach irritation and diarrhœa may be due to their excretion by the gastrointestinal tract.

As far as concerns the urinary organs the result is again doubtful. They are, however, by the author, held in light esteem as diuretics, although they possess the advantage of not irritating the kidneys. In considering the therapeutic application of the nitrites three points are worthy of note: 1. The minute quantity which may influence the vascular system and, as a consequence, certain functions of the body—one-eighth of a grain of sodium nitrite, a small but uncertain fraction of a minim of ethyl nitrite, one sixteen-hundredth of a grain of nitroglycerin. 2. Notwithstanding their potency, even large quantities do not cause death. 3. The action of the nitrites is very evanescent. The class of cases in which these remedies will be of the most utility are those in which the heart is embarrassed in its work owing to a want of due relationship between its power and the calibre of the vessels through which it transmits blood. In angina pectoris it is probable that the increased tension is the cause of suffering, and in its reduction by the use of nitrites the object is threefold: 1. To relieve pain as rapidly as is possible. 2. To avert a fatal termination. 3. To prevent a recurrence of the pain. To relieve the urgent pain and its concomitant danger the fatty nitrites should be inhaled, of which an example is amyl nitrite, although it is impure as now found. The amyl nitrite may fail: 1. If the paroxysms are due to neuralgia of local origin; or it may be reflected or hysterical, and circulatory changes have but little part in its production. 2. Because of the short duration of its action, it does not break the spell of the vessels' contraction. 3. The person may be insusceptible to its influence. 4. The case may be an advanced one which would have been relieved at an earlier stage. In these cases the nitrites whose effect is more lasting should be tried. Of these, nitroglycerin is by far the best, as it reduces tension more quickly than either the sodium or ethyl nitrite. For the prevention of dyspnoea connected with other forms of cardiac, and with pulmonary disease the nitrites are of great service. They are naturally more useful in mitral disease, since here paroxysmal dyspnoea is more frequent than in aortic troubles, but aortic incompetence is no bar to their administration in small quantities when breathing is oppressed. In valvular disease, as in simple

dilatation, weakness and irregularity of the heart's action need not be taken into account in giving small doses for dyspnoëic attacks; such doses do no harm, even if they do no good. Syncope as the result of the failure of the heart to supply the cerebrum with a due amount of blood—and to this condition arterial failure and lowered tension contribute—might appear to be a contra-indication to the use of the nitrites; in some cases it is apparent that they may be useful. Since no bad effects have been recorded, the use of small doses appears to be well justified. In cardiac failure good results have followed, but the difficulty is to graduate the amount of the drug to the necessities of the case. In pulmonary dyspnœa the result is rather uncertain; at times the symptom is benefited whilst the physical signs are unchanged. When abundant moist râles are present and dyspnœa is due to an accumulation of mucus rather than to spasm of the tubes or vessels, they are likely to fail. In uræmic dyspnœa the results have been, at times, disappointing. Although their use has been found to be advantageous, yet they have often failed. In some cases the necessary dose may be large. In migraine and headache these drugs have been much employed and considerable success has been recorded from their use. In migraine they are of more use when the face is pale and the pulse tense. The cases must be those in which there is distinct evidence of high vascular tension.—*The British Medical Journal*, 1893, Nos. 1695, p. 1305; 1696, p. 4; 1697, p. 56; and *The Lancet*, 1893, No. 3646, p. 123.

MEDICINE.

UNDER THE CHARGE OF

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AUTO-INTOXICATION FROM THE GASTRO-INTESTINAL TRACT.

IN a communication recently presented to the Vienna Medical Club, KATZ (*Wiener medicin. Presse*, 1893, No. 28, p. 1093) undertakes to point out the inadequacy of the assumption that the many symptoms presented by individuals suffering with chronic affections of the stomach and intestines depend upon auto-intoxication from the gastro-intestinal tract, and defends the view that ascribes these symptoms to mechanical and reflex influences. The argument is as follows: Among the products of abnormal gastric fermentation butyric and lactic acids are not generated in quantities large enough to produce symptoms of intoxication, as the organism upon which their development

depends cannot survive in strongly acid solutions. Even in the case of a greatly dilated stomach the dilution is so great that no harm results from the presence of an excess of acid. That the lactic acid formed and taken up by the system is disintegrated is indicated by the fact that the acid does not make its appearance in the urine. The same applies to butyric and acetic acids. Even in cases of hyperchlorhydria the concentration of the acid is not sufficient to cause intoxication. Basic products would not be produced in the stomach unless there were a marked deficiency of hydrochloric acid. Salkowski has shown that the peptotoxin of Brieger (which is but feebly, if at all, toxic) is not generated if pure reagents are employed and if accidental putrefaction is guarded against. In the intestine, likewise, the fatty acids and the aromatic products, the phenols, indol, and skatol, are developed in but small amount. The aromatic bodies would have a tendency to exert an antiseptic influence. Ptomaines have seldom been found in the feces, and it is more than probable that they are never formed in the healthy intestine, as they have hitherto only been found in states of abnormal or unusual nitrogenous metabolism, such as occurs in connection with cystinuria, and in case of grave infectious diseases, such as cholera. Thus far, chemical investigation has failed to furnish evidence of the occurrence of auto-intoxication from the gastrointestinal tract. The varying toxicity of the urine is not more demonstrative, and clinical evidence is likewise not more convincing. The transient sense of fatigue, the dyspnoea, the palpitation, the vertigo are readily to be explained by mechanical and reflex processes, for these symptoms usually bear some relation to the ingestion of food and the processes of digestion. This view receives support from the fact that the symptoms occur especially in neurotic persons and largely in women. Therapeutically, also, the best results are not obtained from the administration of antiseptics, but rather from agents that stimulate peristaltic activity.

AMŒBÆ IN THE URINE.

POSNER (*Berliner klin. Wochenschr.*, 1893, No. 28, p. 674) has reported the case of a well-built musician, thirty-seven years old and previously healthy, who was suddenly seized with a chill, followed by a sense of malaise and the appearance of blood in the urine. The only known possible cause for the condition was exposure to cold and wet. The patient was pale, but temperature and pulse were normal, and there was no oedema and no evidence of a heart lesion. Chemical examination confirmed the accuracy of the belief that the urine contained blood, and microscopic examination of the sediment obtained by centrifugation disclosed the presence of numerous bodies constituted of granular protoplasm, and about eight or ten times as large as colorless blood-corpuscles. These contained one or more somewhat oval nuclei, vacuoles, and foreign matters, more particularly red blood-corpuscles. The bodies were plump in form and could be observed to change their shape. Some presented long, delicate processes. The urine contained, besides, red and colorless blood-corpuscles, renal epithelium, and hyaline and granular and blood casts. Rest in bed, and a milk diet were prescribed, and in the course of a few days the amœbæ and the blood gradually disappeared from the urine, although the albumin and tube-casts persisted. For a week the

patient felt quite comfortable. Then there occurred a second paroxysm attended with symptoms like those of the first and lasting for two days. Seven weeks later there occurred a third, and two months after this a fourth paroxysm—on each occasion the presence of amœbæ coinciding with the occurrence of the hæmaturia. A fifth attack occurred eight months after the fourth. The urine gradually cleared up and the patient became quite free from symptoms. There was no evidence of cystitis, and cystoscopic examination failed to disclose any abnormal condition of the bladder, while the presence of tube-casts indicated the kidneys as the source of the amœbæ. The suddenness of onset of the symptoms, in association with the occurrence of a chill, suggested the entrance at this time into the circulation of a new generation of amœbæ or of their spores, but examinations of the blood failed to disclose the presence of abnormal constituents. The only conclusion left is that the organisms reached the kidney from the bladder. The organisms found in the urine were larger than ordinary amœbæ coli and there was not, at any time, any manifestation of intestinal derangement.

THE CONSTITUTION OF THE BLOOD.

At the recent Congress for Internal Medicine, held at Wiesbaden, STINTZING (*Wiener medicin. Presse*, 1893, No. 28, p. 1118) reported the results of examinations, made in conjunction with GUMPRECHT, of the blood obtained from the tip of the finger in 100 cases. It was found that the density of the blood, the amount of hæmoglobin, and the amount of solids bore no constant relation to one another, but that at times a notable disproportion existed. The blood of man normally contains on the average from 78.3 to 79.8 per cent. of water; variations of from $1\frac{1}{2}$ to 2 per cent., however, being quite common. Under abnormal conditions the proportion of water may be augmented more than 10 per cent. In cases of anæmia the proportion of solids may fall so low as 11 per cent.; under such circumstances hydræmia will always be present. Copious libations of water, such as take place in cases of diabetes, have little or no influence upon the proportion of water in the blood. In cases of typical chlorosis the diminution in the amount of hæmoglobin appears to be associated with a diminution in the proportion of solids, slighter than that which takes place in cases of anæmia; it may be that in chlorosis the hæmoglobin is replaced by other substances. In cases of leukæmia the diminution in the amount of solids is likewise relatively slight, evidently as a result of the increase in the number of colorless blood-corpuscles.

A CASE OF MOTOR AGRAPHIA, WITH AUTOPSY.

At a recent meeting of the Société de Biologie, CHARCOT and DUTHIL (*Compt.-rend. hebdom. des Séances de la Soc. de Biol.*, 1893, No. 24, p. 130) reported the case of a woman who, at the age of forty-four years, was stricken with right hemiplegia, associated with paralysis of the tongue. At the end of a reasonable time speech and movement returned, but it was observed that the ability to write spontaneously was lost. The pen could be held perfectly well; the idea of what the woman wished to write could apparently be formed; and the visual conception of the orthography of the words was pre-

served, but ideas of the letters could not be aroused; the forms of the letters could not be recalled. It was known that the woman could write previously to this seizure, and subsequently the ability to read was preserved. At the age of fifty-five years, left hemiplegia and complete loss of speech occurred. Paresis of the left side remained, but after the lapse of two years speech was regained. At the age of sixty-one years a third attack occurred, which was followed by simple embarrassment of speech, with transitory difficulty of articulation. Soon afterward a fourth attack occurred, with complete and permanent loss of speech. Thereafter there developed a pseudo-bulbar glosso-labio-laryngeal paralysis. The patient had to be nourished by means of the tube. On laryngoscopic examination it was found that the vocal bands failed to approximate in attempts at phonation. There was neither word-deafness nor word-blindness. The patient had no difficulty in pointing out objects named by language or in writing. She could transcribe from a copy, either written or printed, but could not write spontaneously or from dictation. It thus appeared that the visual image, the auditory image, and perhaps also the motor image of articulation were preserved, but the mechanism by which thought was transferred into written language was wanting. The condition of the woman continued thus, unchanged, until death took place, at the age of sixty-nine.

Upon post-mortem examination two foci of yellow softening were found in the cortex of the left hemisphere. The one was circular in outline and rather smaller than a dime, and occupied the posterior extremity or foot of the second frontal convolution; the other was much more extensive and triangular in outline. It involved the lower half of the middle third of the second frontal convolution and the foot of the third frontal. Posteriorly and inferiorly this arc of softening extended deeply into the inferior extremity of the ascending frontal convolution; elsewhere, however, it was superficial. The external surface of the right hemisphere presented three foci of softening. The largest area, almost as large as a silver half-dollar, was situated at the inferior extremity of the ascending frontal and parietal convolutions. A second focus was situated in the posterior portion of the middle of the third of the ascending parietal convolution. The third focus was as large as a pea, and situated at the anterior extremity of the third frontal convolution. The inferior surface of the right hemisphere also presented two foci of softening. The larger occupied the middle portion of the first and second temporo-occipital convolutions. The other was situated upon the inferior surface of the frontal lobe. The destruction of the inferior extremity of the left ascending frontal convolution and of the inferior extremity of the right ascending frontal and parietal convolutions explains the pseudo-bulbar palsy. The lesion of the right ascending parietal corresponds with the paresis of the left superior extremity; that of the foot of the left third frontal with the aphasia of articulation, which was masked by the pseudo-bulbar palsy. The lesions at the base of the brain probably gave rise to no symptom. The agraphia is thus to be referred to the lesion of the foot of the left second frontal convolution. The conclusion is expressed that in addition to agraphia of sensory origin (from destruction of the centre of verbal vision or interruption of the fibres connecting this centre with the motor centre of the upper extremity) there is a form of motor agraphia which bears the same relation to written

language as logoplegia (from a lesion of the left third frontal convolution) bears to spoken language. The condition may be defined as an amnesia of the co-ordinated movements for writing. The case reported would seem to demonstrate that the centre for the co-ordination of the movements concerned in writing is situated at the foot of the left second frontal convolution.

M. DÉJÉRINE, in the discussion that followed the report of the case, stated that with the existence of a lesion in the left third frontal convolution, the existence and the localization of a purely motor agraphia seemed scarcely justified. Disturbances of the faculty of writing are common in aphasia of motor or sensory origin dependent upon cortical lesions in the zone of language, and are only wanting in the aphasias resulting from lesions seated without this zone—subcortical motor aphasia, pure verbal deafness and verbal blindness. The hypothesis of a special centre for the movements of writing is scarcely reconcilable with the fact that writing may be performed with the feet. To demonstrate the isolated existence of a motor agraphia it would be necessary to have a case of cortical motor aphasia with integrity of the faculty of writing and a case of agraphia from a lesion of the left second frontal convolution with integrity of speech.

PAIN OF VISCERAL DISEASE.

HEAD has published (*Brain*, Parts I. and II., 1893, pp. 1-133) a most careful and elaborate study of the external areas of pain and disturbed sensation connected with disease of the different viscera, together with diagrams and illustrations that practically summarize the results of the study. He finds that the tender areas in visceral disease and the areas affected in herpes zoster correspond in that (1) they have the same distribution; (2) they do not overlap; (3) they have the same maxima. As herpes probably depends on inflammation of posterior roots, these areas are not to be referred to distribution of special nerves, but to distribution of nerves connected with certain spinal segments.

The reference of pain to the skin when the lesion affects an internal organ, is compared with the phenomenon known as allocheiria, and the explanation of both phenomena is held to be the law that when a painful stimulus is applied to a part of low sensibility in close central connection with a part of much greater sensibility, the resultant pain is felt in the highly sensitive part, rather than in the part of low sensibility directly acted upon. Cutaneous tenderness in visceral disease is ascribed to the fact that the impulses passing by sensory nerves from a diseased organ to a certain segment of the cord set up the disturbance there, so that any additional disturbances due to impulses coming from the skin are modified, usually exaggerated, and thus produce at the center abnormal and, as a rule, painful impressions.

The original work should be consulted, but some idea of the results may be gained from the lists of names given below.

A forthcoming paper, "The Head and Neck," will be devoted to the fifth, sixth, seventh, and eighth cervical segments, which are of special importance.

The present paper maps out—

- D 1, the "Dorso-ulnar," or first dorsal area.
- D 2, the "Dorso-brachial," or second dorsal area.
- D 3, the "Scapulo-brachial," or third dorsal area.
- D 4, the "Dorso-axillary," or fourth dorsal area.
- D 5, the "Scapulo-axillary," or fifth dorsal area.
- D 6, the "Subscapulo-infra-mammary," or sixth dorsal area.
- D 7, the "Subscapulo-ensiform," or seventh dorsal area.
- D 8, the "Middle epigastric," or eighth dorsal area.
- D 9, the "Supra-umbilical," or ninth dorsal area.
- D 10, the "Sub-umbilical," or tenth dorsal area.
- D 11, the "Sacro-iliac," or eleventh dorsal area.
- D 12, the "Sacro-femoral," or twelfth dorsal area.
- L 1, the "Gluteo-crural," or first lumbar area.

(The second, third, and fourth lumbar segments are not primarily represented in visceral disturbances.)

- L 5, the "Fibulo-dorsal," or fifth lumbar area.
- S 1, the "Soleal," or first sacral area.
- S 2, the "Sciatic," or second sacral area.
- S 3, the "Gluteo-pudendal," or third sacral area.
- S 4, the "Coccygeal," or fourth sacral area.

In diseases of the	Tenderness is found over areas
Heart	D 1, D 2, D 3.
Lung	D 1, D 2, D 3, D 4, D 5.
Stomach	D 6, D 7, D 8, D 9.
Intestine	D 9, D 10, D 11, D 12.
Rectum	S 2, S 3, S 4.
Liver and gall-bladder	D 6 (?), D 7, D 8, D 9, D 10.
Kidney and ureter	D 10, D 11, D 12, L 1.
Bladder (mucous membrane and neck)	S 1 (?), S 2, S 3, S 4.
Bladder (overdistention and inefficient contraction)	D 11, D 12, L 1.
Prostate	D 10, D 11, D 12 (?), L 5, S 1, S 2, S 3.
Testis or ovary	D 10.
Epididymis, or uterine appendages	D 11, D 12, L 1.
Uterus (in contraction)	D 10, D 11, D 12, L 1.
Uterus (lower segment and os internum)	S 1 (?), S 2, S 3, S 4.

A CASE OF ADDISON'S DISEASE, WITH NOTE ON METABOLISM.

KOLISCH and PICHLER (*Centralblatt für klinische Medizin*, 1893, No. 12, p. 249) have reported the case of a man, twenty-nine years old, of good family history, who eight years previously had had some febrile affection, attended with night-sweats, but without conclusive evidence of the existence of pulmonary tuberculosis. Subsequently he suffered with digestive derangement, attended with vomiting, but without noteworthy loss of flesh. Within two years, however, following the death of a relative, there had been pro-

gressive loss of strength, with readiness of fatigue after slight mental or physical exercise, and pronounced emaciation. There was no colic, but the digestion was deranged and flatulence and constipation were present. Simultaneously with the emaciation, the skin was noticed to become universally darker, but more decidedly so in certain circumscribed areas. At first a dark patch appeared upon the lower lip, which was followed by others upon the abdomen, the genitalia, the dorsa of the hands, and the forehead. There was no history of syphilis and none of alcoholic excess. The skin was dry; the temperature was normal; there was no œdema. There was considerable diminution in the proportion of hæmoglobin in the blood; the number of red corpuscles was moderately diminished, while the colorless cells showed no material change. There were signs of slight condensation at the apex of the right lung. Heart and urine presented no abnormality. While under observation slight petechial hemorrhages were observed to take place beneath the mucous membrane of the cheek, leaving the overlying epithelium intact. These extravasations were of short duration, but were frequently repeated. As great diversity exists among the reports as to the metabolism in cases of Addison's disease, examinations were made to determine the relation between ingestion and excretion. It was found that the assimilation of both nitrogen and fat and the disintegration of albumin did not materially differ from these processes as they take place in a healthy person; if anything, there was a tendency to the accumulation of albumin.

SUB-DIAPHRAGMATIC GASEOUS ABSCESS; OPERATION; RECOVERY.

VANLAIR (*Revue de Médecine*, 1893, No. 7, p. 561) has reported the case of a child, six years old, that was suddenly seized with a chill, followed by fever and the development of acute abdominal pain, most marked in the epigastrium, together with tympanites and diarrhœa. Soon afterward there developed pronounced polypnœa, though without subjective dyspnœa, without cough, and without abnormal auscultatory phenomena. There was at this time no evidence of the existence of a peritoneal effusion. In the following days the temperature continued to rise, and on the tenth day, in the absence of pleurodynia, a feebleness of the breath sounds at the base of the right lung became evident, with diminished vocal resonance and fremitus, and without râles. At the same time a resistant and painful tumor was observed in the epigastrium, the percussion note over which was dull. It soon became apparent that an effusion of fluid had taken place into the peritoneal and right pleural cavities. A little later broncho-pneumonia developed at the base of the left lung. The fever became irregular; afternoon chilliness was followed by pyrexial exacerbations. The abdominal tumefaction grew tense. Pallor and emaciation were pronounced. After the lapse of several days more the percussion note over the centre of the epigastric tumor became tympanitic—dulness, however, with an increased sense of resistance, persisting at its periphery. Over the central portion there was also to be heard a to-and-fro murmur of metallic timbre, synchronous with the respiratory movements. A few days later, in the absence of signs of a pulmonary cavity and in the absence of an attack of cough, the signs of a pneumothorax appeared at the middle of the lateral aspect of the right chest. A thrombus also

formed in the left femoral vein, coincidently with the appearance of a hard, painful, subcutaneous tumor above Poupart's ligament and corresponding to the point of emergence of the epigastric from the external iliac vein. Surgical intervention was now determined upon. When the abdomen was opened by an incision over the epigastric tumor, there escaped first almost pure pus, then brownish liquid of fecal odor. There was also an escape of gas synchronously with the respiratory movements. It was found that there existed an irregular cavity, bounded above by the diaphragm, below and behind by the transverse colon and the liver, below by the omentum adherent to the anterior abdominal wall. The walls of the cavity were lined by false membrane. The cavity was found to communicate with the transverse colon by means of a small perforation, and with the right pleural cavity through a second and larger perforation of the diaphragm. The opening in the colon was sutured; a drainage-tube was introduced through the diaphragmatic opening into the right pleural cavity and the peripheral extremity brought out through a button-hole by the side of the abdominal incision. A counter-opening was also made at a point low on the lateral aspect of the right chest and a drainage-tube introduced. A physiological saline solution was passed through the drainage-tubes and the epigastric wound was packed with iodoform gauze. The little patient bore the operation admirably. The temperature afterward fell; the appetite improved; and there was generally marked improvement. The secretion from the pleural cavity lessened and assumed a better character. The sutures in the colon, however, did not hold and there was some slight oozing of fecal matter. By means of a third drainage-tube the contents of the colon were diverted from the cavity externally. Local and general improvement was now more marked than it had been. The thoracic opening gradually closed and the drainage-tube was removed. At a later date, however, there was evidence of the formation of a pleuro-pulmonary fistula. The swelling in the groin also underwent softening and threatened to rupture. A final complication was the occurrence of two violent eclamptic attacks. Nevertheless the several fistulæ ultimately closed and the child recovered perfectly.

PECULIAR ODOR OF THE BREATH OF TUBERCULOUS PATIENTS.

ROSENBACH (*Aerztl. Prakt.; Wiener med. Presse*, 1893, No. 28, p. 1114) has called attention to a peculiarity of the breath of tuberculous patients, slightly resembling that of mild cases of putrid bronchitis, but differing from this in having a disagreeably sweet quality. It may become apparent in the neighborhood of the patient even in the absence of expectoration, and it adheres to the expectorated matters but feebly, probably because it is dependent upon the presence of volatile substances. It is only present in the exhaled air and thus becomes most evident when the patient coughs or breathes with open mouth. This sign is of unfavorable prognostic significance, even though the remaining manifestations in the case appear favorable. It is often present when the destructive process is not marked, and is most pronounced when the physical signs are unobtrusive. It is almost always an associated manifestation of disseminated broncho-pneumonic consolidation. It is wanting in cases of extensive infiltration and when cavities have formed, and also when the sputum is copious. In a large number of cases in which this symptom

was observed hæmoptysis occurred. Night-sweats, anorexia, and febrile exacerbations were also frequently noted. The phenomenon is of diagnostic significance, as it early indicates the occurrence of a morbid process in the lungs. The author therefore recommends that, in all doubtful cases in which pulmonary tuberculosis is suspected, the odor of the breath be investigated. If there be uncertainty as to the character and origin of a given odor, it is well to insure a thorough cleansing of the mouth and teeth, to exclude a possible source of error.

RENAL TUBERCULOSIS.

TUFFIER (*Annales des Malad. des Org. Génito-urin.*, 1893, No. 7, p. 495) points out that in addition to hydronephrosis of tuberculous origin, there is also a variety of renal tuberculosis characterized by paroxysmal pain indistinguishable from that of nephritic colic, without detectable enlargement of the kidney and without pyuria or hæmaturia, although it may be possible to find tubercle bacilli in the urine. Besides this form of renal tuberculosis there is another, characterized by the occurrence of hæmaturia and corresponding to the form of pulmonary tuberculosis attended with hæmoptysis. A case is reported in a woman, forty-two years old, of good family and personal history, who, in September, 1888, after a long walk, not especially attended with fatigue, was suddenly seized with hæmaturia. There was no pain, but a sense of burning referred to the bladder. The urine soon resumed its normal appearance. Thereafter, the hæmaturia was repeated from time to time, after intervals of varying duration in which the urine appeared quite normal. The woman became extremely anæmic, almost cachectic in appearance, and weakness became marked. The urine examined in an interval between two attacks presented no abnormality. The physical examination was facilitated by the marked emaciation, but it was not possible to detect any enlargement or lesion of kidney, ureter, or bladder. The manipulation was unattended with pain. The patient at this time would not submit to a cystoscopic examination. Examination of heart, lungs, and other viscera failed to disclose the existence of organic disease. Upon the strength of the evidence it was concluded that there must be a neoplasm of the kidney or of the bladder, the character of the hæmaturia pointing to the bladder. Accordingly the bladder was opened through a hypogastric incision and explored, but no lesion was found. The wound of operation closed readily and without untoward event; but after the lapse of two months there developed in the course of the cicatrix a small spot of fungous ulceration, of the tuberculous nature of which there was no doubt. Shortly afterward hæmaturia recurred, and now a diagnosis of renal tuberculosis was ventured. The right kidney appeared to be a little the larger, but the left was slightly painful. Cystoscopic examination yielded a negative result; for the patient was greatly agitated and, perhaps as a result of spasm, not a drop of blood escaped from either ureter during a period of ten minutes. A second examination, however, showed clearly that the blood came through the left ureter, while the secretion of the right kidney appeared to be normal. In view of the gravity of the situation, it was determined to operate at once and incise and scrape the kidney or excise it, according to the conditions found. No

change was found in the tissues surrounding the kidney. The organ itself was not enlarged, but within its parenchyma several fluctuating areas of softening were found. No enlargement of adjacent lymphatic glands was detected. The organ was removed. There was no surgical complication, and five weeks after the operation the patient appeared to be perfectly well. Tubercle bacilli were found in the contents of the abscesses. There was, however, no communication with pelvis or ureter.

IDIOPATHIC MUSCULAR ATROPHY OF FACIO-SCAPULO-HUMERAL TYPE
IN A BOY SEVEN YEARS OLD.

PRAUTOIS and ÉTIENNE (*Revue de Médecine*, 1893, No. 7, p. 635) have reported the case of a child, seven years old, without neuropathic heredity, born at term after a normal labor, and nourished at the breast for a year, that in early infancy presented non-suppurating adenitis, ciliary blepharitis, and bilateral cataract (for which operation was performed). There had been sore-throat at the age of a year, but at no time fever or convulsions. The child began to walk at the age of seventeen months, but had some difficulty in standing on its feet. The gait was waddling and it would fall frequently. The boy was intelligent; he readily learned to read and to write; he promptly answered questions; his memory was good. He was sufficiently developed for his years, though there was some degree of cranial asymmetry, the occiput being the more prominent upon the right. There was evident a generalized muscular atrophy, predominating, however, in certain groups of muscles, giving rise to a peculiar facies, a drooping of the right shoulder, lumbar lordosis with compensatory dorsal kyphosis, left-sided pes equino-varus. The face was puffy and expressionless, the mouth held open, the upper lip prominent and thickened, the labial commissure depressed, the naso-labial fold obliterated. From time to time there occurred simultaneous movement in the left half of the upper lip and the orbicularis palpebrarum. There was an inability to raise the upper lip and to evert the lower lip. Whistling could only be accomplished by inspiration. When the child laughed or cried the physiognomy remained unmoved. The eyes could be closed but imperfectly. The functional integrity of the masseter muscles was preserved. There was little atrophy of the cervical muscles, all movements being possible. The clavicular portion of the trapezius was preserved. There was slight atrophy of the supraspinatus and infraspinatus, the latissimus dorsi and the pectorales. The adductor portion of the trapezius was profoundly wasted. The scapulæ stood out like wings. The serrati magni were atrophied. The deltoids and the muscles of the arm were atrophied. The muscles of the forearm were affected in less degree. The long supinators were uninvolved. The muscles of the hand escaped. The lumbar muscles and those on either side of the vertebral column were atrophied. The glutei were diminished in volume. The muscles of the thighs were less affected. The calves were full but soft. The anterior muscles of the leg had almost entirely disappeared, especially upon the right side. Motility was greatly deranged. The patient was unable to arise from the dorsal decubitus, without first turning upon his side and using the arms for support. In changing from the erect to the kneeling posture the body was bent forward, the hands placed

upon the thighs, the knees being then suddenly depressed, with the arms held in front and support being afforded by the hands. In arising from the knee-chest position a lateral movement was made until one hand and then the other was applied to the thighs, the erect posture being attained by a sudden final movement. In walking, the lumbar lordosis was exaggerated and the body was thrown backward, the alternate action of the abductor causing the gait to be waddling. The muscles were flabby, but did not present fibrillary contractions. As well as could be determined in so young a subject there was no reaction of degeneration. The reflexes were abolished. Sensibility was preserved in its various forms. The noteworthy features of the case are the early age at which the symptoms were first observed; the asymmetry of the shoulders; the asymmetry of the head; the relation between the atrophy and the electric reactions on the one hand and, on the other hand, the rapidity and embryologic relations of the course of the atrophy, the muscles that were most atrophied being those that develop earliest, while the muscles whose development is normally slow were least affected; the absence of discoverable heredity.

SURGERY.

UNDER THE CHARGE OF

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THE RADICAL CURE OF SPINA BIFIDA, WITH LARGE OSSEOUS DEFICIENCY, BY OSTEOPLASTY.

ROCHET describes the following case (*Archives Provinciales de Chirurgie*, 1892, i., No. 6): Margaret X., aged three and one-half years, had a spina bifida in the cervico-dorsal region about the size of a small orange. It was not pedunculated, but was attached by a large base; the skin over the tumor was thick. There were no convulsive or paralytic phenomena, but there had been a tendency to fainting. There was no hydrocephalus, the sutures were closed, the frontal region was prominent.

Operation. A vertical incision 10 cm. in length was made over the tumor and an attempt made to dissect up lateral skin flaps, but the sac was so adherent to the skin that it was accidentally opened, when a quantity of clear fluid escaped. The nerve roots could be seen at the bottom of the cavity, and the cord in its natural position. The latter was about the size of a goose-quill. After dissecting the sac from the skin it was resected at the junction with the vertebral fissure, the long axis of which measured one and one-half centimetres. The arches were then fractured near their bases on either side,

as advised by Dollinger (1886), brought together in the median line and sutured together. Deep and superficial sutures completed the operation. Recovery followed without incident. Senenco operated after Dollinger's method, and at the end of three to four months the bony case seemed complete.

BERGER operated successfully in the case of a child seven weeks of age by transplanting a plate from the scapula of a young rabbit.

No notable accidents have followed the excision of these tumors.

BELLANGER reports eleven cases in which nervous filaments of various sizes were cut during the operation without any paralytic or anæsthetic phenomena resulting. This observation, originally made by Terrier and Kirrison, is not the exception, but the rule.

There is nearly always a considerable discharge of fluid when the sac is opened; this constitutes one of the great dangers of the operation.

If the tumor has a narrow pedicle it may be treated conservatively. The author prefers the elastic ligature to puncture and iodine injection, although the latter has given very good results, and is well recommended by the English Commission of 1882. If the pedicle is thicker than a penholder excision is called for.

It is advised, when possible, to isolate any nervous trunks that may be found traversing the inner surface of the sac, and restore them to the medullary canal before excising the sac; at the same time attention is called to the fact that in many cases these structures only appear to be true nerves, but have in reality no physiological nervous function, and if it is necessary to cut them no harm will result.

Rochet doubts the value of the simple deep sutures, and recommends the osteoplastic method of closing the defect in all cases.

A CASE OF PNEUMONECTOMY.

LAWSON reports (*British Medical Journal*, 1893, No. 1692) the following case: Mrs. F., aged thirty-four years, had suffered with dyspepsia for fifteen years, and for the past year with pain at the apex of the right lung. She had lost much flesh; there was a short cough, and she perspired freely at night. Her pulse averaged 112, and the evening temperature was 2° to 3° above normal. There were pronounced signs of consolidation at the right apex. As she grew gradually worse under treatment, Lawson concluded to remove the diseased portion of the lung.

An incision was made along the second rib from mid-sternum almost to the anterior axillary fold. The intercostal muscles were separated from the second and third ribs, and the pleura detached from the inner surfaces. By means of a fine saw the ribs were divided at each extremity of the incision. A trocar, connected with a Junker's bottle and bellows, was introduced through the pleura, and air was thus pumped through a hot, strong carbolic solution into the chest. After the lung had collapsed the pleura was incised. There were numerous firm adhesions which had to be torn through before the apex of the lung could be brought out. Finally this was accomplished, the lung was transfixed below the disease by a long needle carrying a sterilized silk thread, and the apex tied off with a Staffordshire knot. The portion

removed was half the size of the fist, and contained a dense tuberculous mass. The stump was rubbed with powdered iodoform, the cavity sponged out, the lung dropped back, and the external wound closed without drainage. Convalescence was satisfactory until the fourth day, when a dry pleurisy developed on the left (sound) side. This passed by, and all went well until the end of the second week, when the temperature record showed an invariable evening elevation, and there was acceleration of the respiratory rate. This continued until the expiration of a month after operation, when a sudden discharge of chocolate-colored fluid from the wound occurred. A rubber tube was introduced and the cavity aspirated. The temperature after this time remained normal, but the discharge became purulent, although it has steadily decreased in amount.

At the time of writing the patient was walking about her room, she had improved rapidly in appetite and in flesh, and was about to go to her home.

The operation presented no difficulties, chloroform was the anæsthetic employed, and no dyspnœa or cyanosis occurred. The author believes it would have been best to have introduced a drainage-tube for a couple of days. One great difficulty will be to determine the cases that are suitable for pneumonectomy. It is said that in the living collapsed lung foci of disease are readily detected by palpation, and many portions might be ligated and removed if necessary.

THE USE OF OIL OF CINNAMON AS AN ANTISEPTIC IN SURGERY.

IN the *Journal de Médecine et de Chirurgie pratiques*, 1893, No. 11, DR. JUST CHAMPIONNIÈRE extols the antiseptic value of oil of cinnamon. The attention of the author was first called to the antiseptic properties of the essential oils by the work of M. Chamberland, in 1887. The ideal antiseptic should be efficient and yet be free from irritating qualities; it should not be poisonous nor possess a disagreeable odor. After numerous experiments with the various volatile oils, Championnière found that the oil of cinnamon was the most active, very closely approaching corrosive sublimate as a microbicide.

Considerable difficulty was experienced in obtaining a preparation of the oil free from irritating properties. When combined with rétinol, however, it was found to be free from this objection. The following formulæ have proven quite satisfactory:

R.—Rétinol	75 grammes.
Sterilized wax sufficient to make of a proper consistence.	
Cinnamon oil	1 gramme.

Or,

R.—Rétinol	75 grammes.
Sterilized wax	25 “
Cinnamon oil	1 gramme.
β-naphthol	1 “

The oil must have been recently re-distilled. The preparation is spread on lint and applied to the wound. The author has employed this preparation in cases of laparotomy, radical cure of hernia, excision of the breast, etc.,

and he claims that extensive wounds, even those which are drained, may be kept in a very satisfactory state of antiseptis.

ADVANCEMENT OF A PORTION OF THE SUPERIOR MAXILLARY BONE IN CASES OF HARE-LIP WITH ANTERIOR CLEFT OF THE HARD PALATE, FOR CORRECTING THE DEFORMITY OF THE ALA NASI.

In the *Medical Record*, New York, 1893, No. 25, WYETH describes an operation which he has devised for correcting the deformity of the nose in cases of hare-lip with a cleft of the alveolar arch. In these cases, after the most perfect plastic operation, the wing of the nose on the side on which the deficiency existed remained flattened. To correct this, the author divides the alveolus of the short side with a pair of bone-forceps, at about its middle, and forcibly advances the anterior segment until it meets the opposite side in front, and sutures it in this position. This places the bony foundations of the alæ nasi and nasal cartilages of the two sides upon a level, thus restoring the symmetry of the nose.

At least eight weeks should elapse before the attempt is made to close the lip. In the cases reported the results were entirely satisfactory.

COSTAL RESECTION IN THE TREATMENT OF COLD ABSCESSES OF THE THORAX.

DAYOT presents the results of his observations (*Archives Provinciales de Chirurgie*, 1892, i., No. 5) on this subject. He has endeavored to settle two questions: 1, the pathological anatomy of these abscesses; and 2, the best method of operative treatment. The author used the iodoform-ether treatment, and in one case obtained a definite cure, but the method is not recommended. The cases treated by incision and erosion all had fistula remaining.

The author had the opportunity of performing an autopsy on a case with subcostal abscess and intercostal diverticula. A rib was found denuded. This led him to the belief that these abscesses usually had their origin in disease of the ribs, and he accordingly practised resection in the cases subsequently coming under his care. Five observations are given, in every one of which osseous lesions were found.

Dayot concludes that the relative frequency of osteitis and periostitis of the ribs coincides with the same lesions elsewhere—that is, osteitis is much the more common.

Resection of the rib over the abscess is invariably indicated. If the diagnosis is doubtful, the same proceeding is advised as an exploratory operation. Absolute antiseptis should be employed. Zinc chloride 1 : 10 is used to brush over the wall of the sac. Drainage with iodoform gauze is recommended. The following conclusions are given :

1. Cold thoracic abscesses arise as least as frequently, if not more so, from costal tuberculous osteitis as from external periostitis.
2. It is necessary to look for this condition, otherwise it may pass undetected, and it can often only be recognized by costal resection.
3. The absence of augmentation of tension during coughing will not elimi-

nate deep abscess. The condition must always be borne in mind and looked for, and the best method is by costal resection.

4. Costal resection applied to cold abscess of the thorax, whatever may be the condition of the rib, is the type of a complete intervention. The operation is simple and free from danger.

VARICOSE ULCERATIONS OF THE RECTUM AND ANUS.

IN the *Revue de Chirurgie*, 1892, No. 12, QUÉNN writes on this subject. No other mucous membrane is so frequently the seat of ulceration as that of the ano-rectal region. Ulcers here may occur in the course of a general affection, as tuberculosis, dysentery, syphilis, Bright's disease. Perhaps more frequently they result from purely local causes, such as soft chancre, mechanical obstruction, or disintegration of a neoplasm. Besides these symptomatic, constitutional, and venereal ulcers, a variety is met with that merits the title "simple ulcers of the rectum."

Simple ulcer is most frequently limited to the region of the sphincter; at times, however, it may be situated higher in the rectal mucosa. The most common of the simple ulcers in the sphincteric region is the ordinary fissure-in-ano. Along with this may be classed the irritable and painful ulcer of Allingham, and the varicose ulcer. According to Allingham, irritable ulcer differs from the simple variety by being round in shape, and by the high situation of the former, which may even be within the internal sphincter. Chronic varicose ulcer was first described by Rokitansky. It is always found in connection with hemorrhoids. In this variety there is less thickening of the borders and less pain than in fissure.

A person suffering from hemorrhoids is more prone than others to fissure, which may develop into a true ulcer. In women, exploration of the rectum is facilitated by introducing one finger into the vagina and pressing downward. As a further assistance the patient may be asked to bear down.

In simple ulcer above the sphincter, the lesion is round, the edges are thickened, the base unequal and red, and very vascular. The varicose ulcers are divided into the irritable and the non-irritable. The irritable variety includes the round ulcer, the painful and irritable ulcer of Allingham, and the more common fissure-like ulcer. The symptoms closely simulate those of fissure. The non-irritable variety includes the superficial ulceration of the mucosa, the small round ulcers, supra- or infra-sphincteric, and the larger ulcer of the margin of the anus, of Péan and Malassez. These are most common in middle and later life. The primary round ulcer is more particularly observed in the aged. The non-irritable varicose ulcer presents three principal symptoms: sensory disturbances, the discharge of mucus more or less purulent, and hemorrhage. The latter is the most important of these, and is at times profuse. The diagnosis depends upon detecting the presence of the ulcer, and determining its exact nature. Digital examination will detect a painful area. It is necessary to employ the speculum for ocular examination.

Syphilitic lesions of this region may belong to the primary, secondary, or tertiary stages. Hard chancre presents its usual characteristics. The lesions of the secondary period are mucous patches, and of the tertiary period, ulcers; the latter is rarely observed. Tubercular ulcers have been observed as

primary lesions and as secondary to pulmonary disease. According to Ball, they present large lesions in the rectal or ano-rectal mucous membrane; they are irregularly rounded and elongated in the vertical diameter; the borders are irregular and raw; the mucosa in the neighborhood is infiltrated and thickened.

The treatment differs with the seat and variety of the lesion. For fissure, the usual treatment suffices. Round ulcers of the margin of the anus require topical applications; they may be cauterized and dressed antiseptically or excised. Superficial erosions may be excised or cauterized. Supra-sphincteric ulcers require the galvano-cautery. Anæsthesia is necessary, and the use of the Sims speculum to give access to the lesion. Boric-acid lotions and iodoform tampons may be used in the after-treatment, and antiseptics, such as naphthol, administered internally.

SPINAL SURGERY.

PHELPS reports (*Journal of Nervous and Mental Diseases*, 1893, No. 7) five cases upon which he operated. Two cases had Pott's disease; both died. One was a fracture of nineteen months' duration; the patient recovered and could walk; one case of old hemorrhage was much improved, and one case of spinal meningitis is reported cured.

Operation is advised in the following class of cases: gunshot wounds of the spine, tumors impinging upon the cord; spinal or cerebro-spinal meningitis (non-epidemic) as soon as dangerous symptoms of compression, which did not improve by treatment, appeared; in hemorrhages into and around the cord; invasion of the canal from burrowing of pus along great nerve trunks, producing purulent meningitis; abscess from diseased vertebræ; some forms of meningitis localized, and certain forms of tubercular meningitis.

Dr. Abbe has recently successfully operated on a case of syringomyelia.

In thirty-six cases of Pott's disease, operated upon by Schede, Horsley, Lane, and Macewen, about 30 per cent. were cured, 40 per cent. unchanged or but slightly improved, and 30 per cent. died as a result of the operation.

The neurologist can be of great assistance to the surgeon in deciding which cases are proper for operative interference, and when operation should be performed.

The author prefers the median incision, cutting off the tips of each vertebra, leaving them attached to the muscles, and removing the spines. A rongeur and bone-cutter are the best instruments to use. In septic conditions the wound should not be closed. A plaster corset should be applied over the dressing each time. Electricity improved the power of the muscles in three cases. The following conclusions are presented:

The outlook for the success of spinal surgery is not so gloomy as it has been painted.

Only incurable cases by other methods should be operated on; then, if one in fifty can be saved, it means much.

Operations in recent fractures and dislocations and gunshot wounds show a large mortality, because of the large number that would die even if an operation was not done. This should not deter the surgeon from operating. Cases that would certainly die, or recover hopelessly paralyzed, may be cured or saved by operation.

Finally, it would be an advantage if the study of spinal surgery could be conducted jointly by the surgeon and the neurologist.

NOTE ON THE TREATMENT OF ACUTE ABSCESS.

AIKMAN (*Glasgow Medical Journal*, 1893, No. 6) has applied to the treatment of acute abscess the suggestions made by Mr. Arthur Barker in the *British Medical Journal*, 1891, vol. i., on the treatment of chronic abscess by scraping, flushing, and immediate suture. The latter observations have been confirmed by surgeons, and in suitable cases this is a valuable method of treatment.

In acute abscess, although the conditions are different, the author believed that similar results might be obtained. He therefore treated a mammary abscess, developing during lactation, a poisoned abscess of the forearm, and some minor cases, by free incision and the dry scoop, or the cavity was irrigated with corrosive sublimate, one part to ten thousand of boiled water, by means of Lister's modification of Barker's flushing scoop. Deep and superficial stitches were employed to close the wound, and an antiseptic dressing applied. In each case primary union followed, without a sign of suppuration. The author appends the following summary:

The free incision is needful, not for the drainage of the cavity, but for the drainage of inflamed tissues infiltrated with serum.

The more frequent change of dressings, at least in the early stage, is probably needful to preserve asepsis.

The flushing during the scraping process is probably not required, in view of the free incision and fuller access to all parts of the wound for later antiseptic measures.

The scraped surfaces may be approximated closely because the deeper parts are less infiltrated than the superficial structures, and require less drainage.

Silver sutures are preferable in view of the soaking of the earlier dressings by serous discharge. I have always drawn them tight, and found that they loosened sufficiently where the tissues had drained a little. I have always made considerable pressure on the dressings by means of a firm bandage.

I commend these suggestions, from a limited experience in private practice, to those who have larger opportunities, in the belief that they will tend to shorten convalescence in suitable cases.

LATERAL PHARYNGOTOMY FOR THE REMOVAL OF THE TONSIL FOR MALIGNANT DISEASE.

CHAVASSE, in a lecture on this subject (*Lancet*, London, 1893, vol. i., No. 23), exhibited a patient upon whom he had performed the operation more than a year previously. The patient was thirty-five years of age. He first noticed a small growth at the site of the nail of the right thumb. This resisted treatment, and recurred after scraping. It was thought to be sarcomatous, and the last phalanx of the thumb was removed November 20, 1889. Microscopic examination proved the growth to be a round-cell sarcoma. August 20, 1891, the thumb was removed at the carpo-metacarpal articulation, for recurrence in the stump. The histology of the growth was the same as

before. In January, 1892, the patient noticed that the left tonsil was enlarged and lumpy; he suffered no pain or inconvenience, save a slight hemorrhage. Although syphilis was denied, a course of mercury was administered, during which the growth rapidly increased in size. No other structures were involved. It was resolved to remove the tonsil by an external incision. This was made from the lobule of the ear to the cornu of the hyoid bone. After reaching the pharyngeal wall, a second incision was made from the angle of the mouth to meet the first. In this way the tonsil was readily accessible, and its removal, together with the faucial pillars, by means of scissors was easily accomplished. A drainage-tube was inserted into the pharynx and the wound closed with silkworm-gut sutures. Recovery was prompt, and there has been no recurrence.

The author gives the symptoms in the case detailed, which may be taken as a type, as follows: (1) Pain. This was described as of a lancinating or pulsating character, and was much felt in the ear. Manipulation of the throat increased the pain in the tonsil, but the reflex sensibility of the throat generally was diminished. (2) There was an increased flow of saliva. (3) Dysphagia. (4) Hemorrhage. This was only slight. By those of larger experience it is said to occur in the later stages of the disease, and to come from branches of the external carotid artery. (5) The affected tonsil is at first enlarged, ulceration follows, and the process is somewhat similar to the process seen in cancer of the tongue, the sore being covered with a grayish pulpy slough; its edges are red and its base indurated. (6) Of the adjacent structures, the anterior pillar of the fauces is the first to become involved. The posterior nares and the larynx are said to be rarely affected. (7) The lymphatic glands of the neck, especially about the angle of the jaw, show early signs of infection. (8) Men are the subjects most frequently attacked. This has been attributed to their smoking tobacco. (9) In the published cases the left tonsil seems a little more liable to be affected than the right. In the author's cases, two of the three have been on the left side.

The diagnosis of these cases is frequently difficult. They must be distinguished from—(1) Simple hypertrophy of the tonsil. This occurring on one side only in patients about or beyond middle life, should be regarded with suspicion. (2) Syphilis. This occurs either as a chancre or as a mucous patch. The chancre is usually found in youngish women; it has a regular oval or circular appearance and evenness of base and edges. Early periauricular adenitis is evident. Under appropriate treatment it rapidly heals. The mucous patch is not deeply ulcerated; its base is gray; it is indolent, and adenitis is not marked. (3) Tubercle. There is no induration, no adenitis, and no bleeding, and the surface is granular. (4) Lympho-sarcoma. This is found in young subjects, is of large volume, soft growth, gray slough, and becomes quickly adherent to vessels.

The average duration of life in these cases, if left untouched, is given as 12.4 months. According to Donaldson, it is not more than nine months.

THE EMPLOYMENT OF IODOFORM IN ABDOMINAL OPERATIONS.

IN the *Lancet*, London, 1893, vol. i., No. 23, MR. FREDERICK TREVES describes what seems to be a new use of iodoform. After quoting from a recent

article by Lister to show that although not germicidal outside of the body, iodoform is, nevertheless, a valuable application in the treatment of wounds, probably on account of a chemical effect upon the product of the bacteria; the author states that for some time he has been in the habit of dusting the exposed tissues in deep wounds freely with this substance.

In the present paper he gives his experience with a like employment of iodoform within the abdomen. The cases reported include nephrectomy for pyonephrosis with post-renal abscess; ovarian tumor; fecal fistula following suppuration and rupture of a dermoid cyst of the ovary; abscess of the liver; cholecystotomy; nephrectomy for hydronephrosis and resection of the intestine. The iodoform is used by liberally dusting the exposed tissues in the depths of the wound, and where packing is required, gauze well dusted with the drug is employed.

The author says: "It would be illogical to argue that the results obtained in the subjoined series of cases were wholly dependent upon the employment of iodoform. They were cases, however, which are apt to be followed by certain dangers and complications, and I am compelled to believe that the uniformly uneventful course observed in each of the cases was not entirely unassociated with the use of this potent drug."

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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ŒSOPHAGOSCOPY.

DR. LUDWIG LOWE, of Berlin, contributes (*Deut. med. Wochenschr.*, 1893, No. 12) an historic epitome of the subject, and describes and depicts his own appliance for visual examination of the interior of the œsophagus, and describes and depicts the laryngo-œsophageal images observed in the pharyngeal mirror with the œsophagoscope at different levels. The essential features of Dr. Lowe's œsophagoscope are a hood at the top and a hinge in the middle, but they cannot be satisfactorily presented in a short summary, and, therefore, for the present, we must refer our interested readers to the original paper.

LONG SOJOURN OF A FOREIGN BODY IN THE NOSE.

WIESMANN, of Herisau, reports (*Corresp.-bl. f. Schweizer Aerzte*, 1892, H. 3; *Internat. Centralbl. f. Laryngologie, etc.*, July, 1893) a rhinolith composed of a cherry-stone enveloped in chalk which had been removed after a sojourn of sixty years, with intense ozæna as a sequence.

MR. ALFRED WARING reports (*Brit. Med. Journ.*, July 15, 1893) a rhinolith,

also with a cherry-stone nucleus, in the nose of a housemaid, thirty-one years of age. The cherry-stone was one of several introduced at four years of age, and had remained without producing any symptoms whatever until some two years and a half before its removal, and immediately subsequent to an attack of influenza.

PHOTOGRAPHY OF THE LARYNX.

AN illustrated article (*Deutsche med. Wochenschr.*, 1893, No. 12) by DR. A. MUSEHOLD, of Berlin, gives a succinct summary of work by previous observers, and describes and illustrates his own apparatus and pictures.

DEATH AFTER OPERATION FOR CONGENITAL OCCLUSION OF A NASAL PASSAGE.

VICTOR LANGE reports (*Deutsche med. Wochenschr.*, 1892, No. 29) the death of a strongly built man, nineteen years of age, six days after electro-caustic division of an occluding plate in the right nasal passage, osseous above and membranous below. The death was attributed to thrombosis of a sinus.

ALVEOLAR SARCOMA OF THE PALATE.

DR. T. V. FITZPATRICK, of Cincinnati, reports (*Journ. of Laryngology*, 1893, No. 6) the case, which is illustrated. It occurred in a married woman fifty years of age, and had been growing for fifteen years. It was removed by incision and enucleation, having been encapsuled.

HEMORRHAGE FROM THE BASE OF THE TONGUE.

M. JOAL has observed (*Soc. Francaise d'Otologie, etc.*; *Archives Internationales de Laryngologie, etc.*, 1893, No. 3) three persons presumed to have tuberculosis in consequence of expectorations of blood, and general debility. The lungs were sound. The sputa were free from bacilli. Inspection of the throat with the mirror revealed the source of the hemorrhages in ulcerations and vascular ruptures in the vicinity of an hypertrophied mass of lymphoid tissue at the base of the tongue—the so-called lingual tonsil.

RECURRENT SUBMUCOUS HEMORRHAGES FROM THE VOCAL BANDS.

M. POYET reports (*Ibid.*) three cases: one followed a violent effort; one, a moderate vocal effort during the menstrual period; and the third was in a bleeder. M. Joal remarked that he had had a female singer under his care who for seven years had carried a large vascular dilatation upon the surface of the left vocal band which had not impaired her voice.

TUBERCULOSIS OF THE NECK IN A MAN FORMERLY CURED OF A LARYNGEAL TUBERCULOSIS.

DR. KÖBNER presented to the Berliner med. Gesellschaft (*Deutsche med. Wochenschr.*, 1893, No. 12) a man with a tuberculous ulcer the size of a silver

dollar in the hairy part of his neck just below the chin. Seven years previously he had been under laryngoscopic treatment for an ulceration on the vocal cords which had healed within some eight months. He was well for four years when a small sore broke out in the sub-mental region, which soon became covered with a crust, and which gradually enlarged to the size of a pfennig, the parts meanwhile having been shaved once a week. Despite the suspension of the use of the razor the ulcer gradually extended to its present size. Dr. Köbner found typical tubercle with giant cells and numerous bacilli on a portion of the border of the ulcer removed for the purpose. Some nine months previously tuberculosis reappeared in the larynx and gradually extended into the pharynx. The neighboring lymph glands were swollen, hard, and painless.

OIL OF NAPHTHA IN INFECTIOUS SORE-THROAT.

DR. G. DUMONT, of Lille (*Rev. Internat. de Rhinologie, etc.*, 1893, No. 10), recommends applications of a solution to the contaminated points, as follows: Essence of petroleum 20 grammes, sulphuric ether 5 grammes, finely powdered iodoform 50 centigrammes, and essence of peppermint 20 drops. This is applied every ten minutes during the acute period of the disease, and afterward at intervals of not longer than one hour; and they are continued at longer intervals for several days after the disappearance of the false membranes.

SUB-HYOID PHARYNGOTOMY.

THIS operation is so seldom required that we call special attention to an instance in which it became necessary for the removal of a retro-pharyngeal morbid growth which turned out to be a fusicellar angiosarcoma. The entire middle third of the posterior wall of the pharynx of a sailor was occupied by the growth, which impeded both glutition and respiration, and which moved somewhat to make swallowing practicable. DR. JAKOVLEFF, in whose practice the case occurred (*Chirurgencheskaya letopis*, 1892; *Arch. Internacionales de Rinologia, etc.*, 1893, No. 31), first performed tracheotomy, and endeavored to remove the growth through the mouth six days later. This failed; and so on the tenth day he cut into the pharynx below the hyoid bone, and was able to remove the growth by enucleation.

POLYPS OF THE NASAL SEPTUM.

POLYPI of the nasal septum are so rare as to have led many men of large experience to deny their occurrence, but the autopsic-anatomical investigations of Zuckerkandl long ago confirmed the statements of a few observers who reported having encountered such growths in living subjects. Quite recently DR. MARCEL NATIER reported (*Arch. Internacionales de Rinologia, etc.*, 1893, No. 31) two cases in detail, both in young women, one in his own practice and the other in that of Dr. v. Lange. Both took origin from the cartilaginous portion of the septum, in one instance on the right side, in the other on the left. Removal of the growth in Dr. Natier's patient was attended with an abundant hemorrhage. Recurrence in place ensued within a few

weeks, and removal was not attended with so much hemorrhage. The point of implantation of the pedicle was cauterized with the electric cautery, and further recurrence seemed to have been thereby prevented.

PARENCHYMATOUS INJECTIONS IN TONSILLITIS.

DR. R. M. RADNITZ uses this practice (*Rev. Internat. de Rhinologie, etc.*, 1883, No. 10) in all cases of tonsillitis, whether folliculous, scarlatinous, diphtheroid, or truly diphtheritic. He claims that it always subdues the fever, sometimes completely, so that there is no recurrence. He employs chlorinated water, or carbolic acid solution, 1 per cent., using four syringefuls daily. Furthermore, he washes the orifices of the crypts of the tonsils with a sublimate solution of 0.01 per cent.

DERMATOLOGY.

UNDER THE CHARGE OF

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DIFFUSE ERYTHEMA PRODUCED BY THE INTERNAL ADMINISTRATION OF ARSENIC.

NICHOLSON reports a case (*British Journal of Dermatology*, June, 1893) in which three-minim doses of liq. arsenicalis produced a universal erythema. The eruption was most marked on the abdomen, chest, thighs, and upper arms, the skin presenting in these regions a "boiled-lobster" appearance. Upon the fingers there were numerous papules. The conjunctivæ were slightly congested and there was some diarrhœa. Upon suspending the arsenic the eruption quickly disappeared with slight furfuraceous desquamation. Altogether the patient had taken but fifteen minims of the solution.

PALPEBRAL ECZEMA.

TROUSSEAU (*Annales de Dermatologie et de Syphiligraphie*, 1893, No. 5) regards antiseptics as of great value in the treatment of this often obstinate affection. In order to procure asepsis of the affected region he regards it as necessary to cure as rapidly as possible the eczematous conjunctivitis which always accompanies the affection of the lids, employing for this purpose a solution of sublimate 1 : 10,000, which is later increased to 1 : 2000. This solution is applied not only to the conjunctiva but also to the cutaneous surface, employing at the same time frequent bathing with watery solutions of boric acid. In order to procure repose of the lids the eyes should be kept closed,

and scratching is to be carefully avoided. If the eczema is much irritated the antiseptic solutions are applied during the day, and antiseptic poultices of rice-flour at night. When there is much oozing the poultices should be replaced by powders of bismuth, oxide of zinc, or boric acid. Fissures are to be touched with a three per cent. solution of nitrate of silver. For itching, water containing a small proportion of alcohol, or one-half per cent. solution of carbolic acid in water may be used, and quinine given internally. Ointments are to be employed only in the terminal stage when desquamation appears, beginning with those that are least irritating.

THE CURE OF SUPERFICIAL EPITHELIOMA.

At the séance of June 8, 1893, of the Société de Dermatologie et de Syphiligraphie (*La Semaine Médicale*, June 10, 1893), DARIER presented five cases of epithelioma of the eyelids which had been cured within a short time by the alternate application of methyl-blue and chromic acid. These applications were made in the following manner: The ulcerated surface was first freed from crusts, and where the border of the ulcer was hard and thick it was lightly touched with the galvano-cautery in order that the chemical agents might the more readily penetrate to the deeper parts. To the surface thus prepared a ten per cent. solution of methyl-blue, in equal parts of alcohol and glycerin, was applied with a brush, and immediately afterward a twenty per cent solution of chromic acid; the blue was then again applied and the ulcer covered with antiseptic cataplasms or sublimated compresses to prevent the formation of crusts. These applications were made four to five times at intervals of two to three days, after which the blue alone was used until the new-formed skin no longer absorbed the color. The treatment of superficial epitheliomata by this method lasted from three weeks to two months.

NATURE OF VERNIX CASEOSA.

WALLACE BEATTY (*Brit. Journ. of Derm.*, July, 1893) examined the skin of the head of a newborn infant whose scalp at birth was covered with vernix caseosa. The infant died a few minutes after birth. Osmic acid stained sections showed that the vernix caseosa is derived from the sebaceous glands, and not, as Unna holds, from the sweat glands.

RINGED HAIR.

CROCKER reports (*British Journal of Dermatology*, June, 1893) a new case of this rare condition. The patient was a girl about eight years of age, and the affection had been noticed for about two years, the mother dating the change from an attack of contagious ophthalmia following what was believed to be an attack of influenza. The patient's hair was naturally dark, but had been bleached by the application of peroxide of hydrogen and turpentine. In certain lights the alteration was visible to the naked eye, the hair having a mottled appearance, and when examined with a lens alternate bands of light and dark could be seen. Under microscopic examination by transmitted light, the light areas resembled pigment masses, but by reflected light these were seen to be air bubbles which, in places, filled the whole diameter

of the shaft in longitudinal heaps. The infiltration commenced in the medullary portion of the shaft just above the root, and extended along the whole shaft. The whole scalp was affected, but the condition was most marked upon the left side. The hair was not as long as it used to be, and did not seem to grow.

MORVAN'S DISEASE.

J. HOGARTH PRINGLE (*Brit. Journ. of Derm.*, July, 1893) discusses this disease, with special reference to the dermatological picture. Morvan gave the characteristics of the disease as being "paresis with analgesia of the superior extremities, at first limited to one side, passing then to the opposite side, ending always in the production of one or more whitlows."

Charcot now considers Morvan's disease to be syringomyelia in a modified form, following the views of Roth. Many observers have been struck with the resemblance between Morvan's disease and anæsthetic leprosy, some authorities, as Zambaco Pasha, stating that Morvan's disease and syringomyelia "are only anæsthetic leprosy modified by civilization, climate, and, above all, by hygienic conditions;" but others, as Thibierge and the author of the paper under consideration, do not think that the identity of the two diseases is proven.

THE TREATMENT OF CERTAIN FORMS OF ACNE ROSACEA.

PROF. PETRINI (*La Roumaine Médicale*, May, 1893) recommends the following application in the treatment of acne rosacea:

R.—Collodion flexil.	.	.	.	.	.	.	.	.	30
Ichthyol	.	.	.	.	.	.	.	.	2
Resorcin	.	.	.	.	.	.	.	.	1 M.

This mixture is painted over the diseased parts, all pustules present having been previously opened for three successive days. After five to six days the applications are repeated as before.

THE PASSAGE OF MICROBES THROUGH THE SKIN.

WASMUTH (*Journ. Amer. Med. Assoc.*, April 22, 1893) describes experiments upon lower animals and man to determine the extent to which different microbes can enter the skin. In man, the pure culture of staphylococcus was rubbed into the arm, and in animals the cocci of erysipelas and carbuncle. If the cultures were merely spread on the skin the results were negative; but if they were rubbed in it was found that the unbroken skin was permeable to these organisms, and that after they were introduced in this way characteristic local and general disturbances followed. The bacilli enter between the sheath and hair-shaft, and not through the openings of the sweat or sebaceous glands.

DEEP-SEATED TRICHOPHYTIC AFFECTIONS.

SABOURAUD, of the St. Louis Hospital, Paris (*Annales de l'Institut Pasteur*, 1893), has studied these affections, and gives his conclusions as follows: Tinea tonsurans, especially in children in the form known as tinea kerion,

tinea sycosis of the beard, and "agminated peri-folliculitis," are all the same disease, of which the localization is different. The disease is of a mycotic nature, and is due to a special trichophyton. Usually upon man it results from animal contagion, and generally it is the horse from which man contracts it. The lesions are similar upon both man and horse.

SYCOSIS AND FOLLICULITIS.

EHRMANN (*Wiener medizinische Presse*, 1893, Nos. 9 and 10) relying upon the experiments of Garré, Bumm, and Bockhart, accepts unreservedly the bacterial origin of these two diseases, which, although differing somewhat clinically, are etiologically identical, both being due to the invasion of the hair follicles by the staphylococcus pyogenes aureus. In order to overcome the chief obstacle in the way of successful treatment, viz., the difficulty we experience in getting the remedies used deeply into the skin, Ehrmann has employed cataphoresis with good results, using 20-30 per cent solution of ichthyol with a current strength of 20 milliampères. When sinuses exist with sclerosis of the surrounding tissues, it is necessary to lay these open in order that the micro-organisms may all be destroyed. The diseased parts themselves must not only be treated, but all localities from which a reinfection might arise, such as the nasal cavities, the external auditory canal, and care should be taken to avoid the use of unclean combs, brushes, and razors, on all of which the staphylococcus pyogenes has been found.

OBSTETRICS.

UNDER THE CHARGE OF

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A MODIFICATION OF THE MARTIN-WEIGAND METHOD OF DELIVERY OF THE AFTER-COMING HEAD.

OSTERMANN (*Berliner klinische Wochenschrift*, 1893, No. 20) describes a modification of the Martin-Weigand method for the delivery of the after-coming head. He recommends applying the hands as in the above-named method, until the brow is at the internal conjugate. At this point he goes well to the patient's side, and, changing hands, passes the left arm along the abdomen of the child, with the first two fingers in its mouth, raises the body with the back toward the mother's abdomen. He regards it as very

important to the protection of the perineum, that the right hand should be placed against this part in such a manner that pressure is made through it against the child's forehead with the ball of the thumb and four fingers. He claims that by the side position of the obstetrician, with the elbow of the inserted hand pointed in an upward direction above the mother's body, he can best control both the child and the perineum and can see clearly the face of the child in the vulva. There is in this manner of lifting the feet no lever action, as in the Prague method. He further says that in the support of the perineum a stroking pressure should be made from behind forward and from the sides toward the centre, until the head comes into the vulva, when a cautious stretching in the opposite direction should be in order. In the application of forceps in these cases, we have the choice of two methods: of guiding the head until the proper time has arrived to apply the instruments; or by drawing the head down until its greatest periphery comes into the diameter, and then taking off the blades and allowing spontaneous delivery; in either case the method of protecting the perineum is the same. The author also thinks his modified position of the child particularly unfavorable for allowing mucus to collect and be drawn into the child's larynx.

LEECHES IN ECLAMPSIA.

YOUNG (*Lancet*, 1893, p. 1255) reports a case of puerperal eclampsia in which, symptoms of cerebral congestion appearing, he applied leeches to the head with highly satisfactory results. Bromidin was used to control the spasms. Examination of the urine showed albumin in large quantities. At time of writing, patient was in a fair way to recovery. A slight optic neuritis was found by the ophthalmoscope.

FATAL ANTE-PARTUM HEMORRHAGE.

PIERCE (*Boston Med. and Surg. Journ.*, 1893, No. 24) reports two fatal cases of ante-partum hemorrhage. In the first no external bleeding could be seen, but a large organized clot was passed after the birth of the child. The placenta showed that it had been separated from the uterus for about a quarter of its surface.

In the second there was a history of post-partum hemorrhage at the last two labors. Considerable external bleeding appeared, and the placenta showed evidence of having been separated from the uterus at its centre for a space of three inches. In both cases a constant, severe, bearing-down pain was almost the first symptom and was continually present. In each instance the child was dead when born.

THE SURGICAL TREATMENT OF SEPTIC PERITONITIS.

WORCESTER (*Boston Medical and Surgical Journal*, 1893, No. 24) considers that the only reasonable treatment for puerperal septic peritonitis is surgical. It is absolutely necessary to find the source of infection, to remove it if possible, and, failing that, to render it less noxious by thoroughly draining the peritoneal cavity. Given any case of septic peritonitis occurring in the puerperium, there is no certainty, except by surgical exploration, that the trouble is not due, for instance, to a perforation of the intestine. He does

not consider medicinal treatment of much account in these cases, as, not knowing the cause producing the peritonitis, the drug given may only increase the infective process. Three very interesting cases are reported. In the first, which terminated fatally on the thirtieth day after delivery, no operation was attempted. The broad ligaments were found riddled with pus sinuses evidently connecting with an abscess next the cæcum. The uterus was honeycombed, and its tissue soaked with ichorous pus. The last two cases reported were, in character, much like the first; in the second an operation was done, but too late, the patient dying. The third, however, had a more happy termination, laparotomy having been done early in the disease. Patient made a good recovery.

CHLORAL IN THE TREATMENT OF ECLAMPSIA.

CHARPENTIER (*Nouvelles Archives d'Obstétrique et Gynécologie*, 1893, No. 4) reports the autopsies of thirty-six cases of eclampsia, all treated with chloral or chloroform. Length of narcosis in no case over five to six hours. In all were found lesions of heart, lungs, brain, kidneys, spleen, or liver, but nothing indicative of fatal chloroform poisoning. His method with chloral is to give rectal injections of 4 grm. in 60 grm. mucilage of quince. If this be returned, a second, and, if needed, a third is given until the drug be tolerated, regardless whether the attack continues or not. An interval with no chloral is then allowed for five or six hours. It is then readministered, dose 4 grm., and another interval allowed. He rarely exceeds 12 grm. in eighteen to twenty-four hours, but has used 16 grm. at times. If the attack ceases after the first series of doses, the medication is slowly withdrawn; if not, the doses are approximated. The medication is never to be abruptly withdrawn, but after the injections are dropped, doses by the mouth are continued. Usually labor comes on spontaneously, and if the contractions be vigorous, it is let alone; if not, the forceps is used. Out of 454 cases, the infant mortality was 36.12 per cent. during the labor. His conclusions are:

1. All pregnant women with albuminuria are subject [liable?] to eclampsia. Always examine the urine of a pregnant woman, and if a trace even of albumin be found, put her on *absolute milk diet*. This is the preventive treatment.
2. If patient be strong and vigorous, and if cyanosis is present, bleed 400 to 500 grm.; then administer chloral and put on milk diet.
3. If patient be not strong, bleeding should not be done; chloral should be used.
4. Await spontaneous labor, if possible; if not, use forceps or version.
5. Induced labor to be held in reserve.
6. Reject Cæsarean section and all forcible interference.

THE CAUSES OF THE DEATH OF ONE TWIN IN DOUBLE PREGNANCIES.

EUSTACE, in an article on the causes leading to the death of one twin in double pregnancies (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1893, No. 4), writes that it is a matter of common remark that the individual children in twin pregnancies are smaller than in single births, and one twin is often far more developed than the other. Indeed, one may have so much

stronger vital or attractive force than the other as to finally starve its companion, the stronger living at the expense of the weaker. If one twin die shortly before birth, its body is simply macerated; if early in the pregnancy, it undergoes various modifications. A case is recorded in which, at birth, attached to the placenta of the living child was found a sac containing a second placenta, cord, and perfect three months' fetus. It was quite dry, and flattened out by the pressure of the living child and uterine walls. Again, a twin may undergo arrest of development and conversion into a monstrosity, while its companion remains normal. The death of one in no way injures the other twin, and often seems to increase its growth by the increased supply of nutrition.

URÆMIC CONVULSIONS WITHOUT ECLAMPSIA.

BOUDIN (*Journal de Médecine de Paris*, 1893, No. 22) narrates an interesting case of uræmia in a woman, a IV-para, at seven months' gestation. Patient had been previously well except for slight swelling of legs and headache. Three days before admission she had lost blood and had had intense dyspnœa which returned at intervals. When seen at La Charité she presented total unconsciousness with tendency to uræmic convulsions. Urine albuminous with accompanying hyaline and epithelial casts. By warm baths, cups, and, later, bleeding, she was restored to consciousness. The secretion of urine was soon established and the bowels freely opened. On the next day labor set in and a dead seven months' fetus was born. The placenta showed multiple clots. On the following night dyspnœa again set in, but by means of hot baths and milk diet the patient finally recovered.

In this case there was no eclampsia, no œdema, no history of poisoning by alcohol or chloral, and, had chloroform been used, the result had probably been fatal. In convulsions occurring during pregnancy, one must distinguish between eclampsia and uræmia. Regarding the use of pilocarpine he considers that while it promotes sweating, at the same time it causes a bronchial hypersecretion that often proves fatal.

THE COLPEURYNTER AS A MEANS OF UTERINE DILATATION.

DÜHRSEN (*Centralblatt f. Gynäk.*, No. 23, 1893) considers the subject of artificial dilatation of the cervix to aid delivery. For this purpose he uses a colpeurynter with thin walls, which he inserts, by means of forceps, into the os and fills with water. He has used this method with considerable success in cases of placenta prævia; in cases where from premature rupture of the membranes the labor pains cease, and it has also been of service in several pathological positions and presentations. He reports the summary of twenty-two cases in which this method has been of service.

RUPTURE OF THE UTERUS COMPLICATED BY RETAINED PLACENTA.

WASTEN (*St. Petersburg med. Wochenschrift*, No. 19, 1893) reports the case of a woman with retained placenta. History of no abortions, and eight normal births. Pains during two days; labor lasting longer than usual and a dead fetus was delivered with forceps. On the following afternoon on

admission to hospital, pelvic measurements were found as follows: Inter-spinous, 27.5 cm.; iliac crest, 29 cm.; trochanter, 33 cm.; external conjugate, 18½ cm. Umbilical cord was found hanging from genitals; uterine cavity was empty. Upon examination of the cord, it was found to lead to a placenta lodged in the abdominal cavity. The patient was in a state of general collapse. Temperature, 37.6° C.

Laparotomy having been performed, the placenta was found amid clots resting on the front of external uterine wall. Cord cut and withdrawn *per vaginam*; placenta through abdominal incision. Uterus drawn through the wound; it was well contracted and not bleeding. Supra-vaginal amputation of uterus was performed, the stump being replaced in the abdominal cavity. Patient did well, notwithstanding endometritis arose in the remnant of the cervical canal.

On examination of the uterus after section it was found that rupture had taken place at the placental site; no difference in structure was found by the microscope, however.

In conclusion, the author says: "I have not used the elastic ligature [in uterine amputations], after tying the lateral ligament; I bind the collum uteri in two or three bundles in the same way as a pedicle of a cyst, then I place over the ligature two pincettes and cut the tumor off above them. The stump is not sewed with the peritoneum, but is dropped into the abdominal cavity, and if needed a T-drain is placed through the vagina posteriorly."

FIVE LAPAROTOMIES FOR ECTOPIC PREGNANCY.

MARTIN (*Berliner klin. Wochenschrift*, 1893, No. 23) reports five cases of ectopic gestation.

In the first, upon laparotomy the abdomen was found full of clots and blood; the tumor was on the right side, attached all around. Inside the sac a fœtus, ten centimetres long, was found. Extensive adhesions to the small intestine were present. Pedicle of tumor was in the right lateral ligament. Chronic purulent oöphoritis and salpingitis were found. The fœtus was macerated and imbedded in amniotic fluid; cord eleven centimetres long. The case had a fatal termination.

Case 2. A cystic tumor of right ovary with hemorrhage due to a fall. Laparotomy revealed a right tubal pregnancy near the ampulla. Blood was found in the ovisac and in the great cystic cavity of the ovary. Resorption of the fœtus. Rupture of the sac had occurred through the resulting hemorrhage, perhaps due to a fall she had sustained. Patient died suddenly from dyspnœa six hours later.

Case 3. Laparotomy relieved a gravid condition of the left tube at the ampulla. No fœtus could be found. The preparation is about the size of a fist, ragged in surface, with the end nearest the uterine end of the tube attached like a stalk. The tube was normal in thickness; mucous membrane healthy. This ampullar sac seems of about five weeks; it is continuous with the tube; the ovary forms part of the sac wall. Patient was discharged cured in seventeen days.

Case 4. Extra-uterine pregnancy of ovarian type. Operation showed hæmatoma of right ampulla of tube. The right side of the uterus was firmly

adherent to the tumor, as was also the posterior leaf of the broad ligament and the pelvic wall. Left tube converted into a sac attached in the depths of the pelvis to the unchanged ovary; this sac contained pus. Left appendage removed. Recovery complete.

Case 5. Gravid condition of the left ampulla of the tube; an extensive swelling occupied the left pelvis adherent to pelvic wall and intestine. The tumor was isolated to a stalk, which was tied. The bed of the swelling, which was lifted from Douglas' cul-de-sac, showed purulent exudate. Preparation shows a mass of vessels and tissue that together form a cyst wall. No recognizable follicle, but much thickened tube and hypertrophied sac wall. In the ampulla is a hæmatoma the size of a cherry. The fimbriated end opens on the concave side; the inner surface of the mouth of the sac is open. The patient recovered after several collapses.

THE PRESENCE OF SUGAR IN THE URINE OF PREGNANT AND NURSING WOMEN.

BERBEROFF (*Vratch*, 1893, No. 16), after a careful investigation of the urine of women in the pregnant and puerperal states, has given the following interesting results of his experiments: The urine in all cases was drawn by a catheter, the specific gravity taken, and all albumin eliminated. Sugar was tested for by the tests of Trommer, Nylander, and Rubne, and when all three tests proved the presence of sugar it was considered positive. The urine of 45 women was examined, and of these 9 were pregnant, 25 confined, and 12 nursing.

The results were as follows:

1. During the last month of pregnancy no sugar was found.
2. Of the 25 parturients, 10 gave a positive result; 3 a trace; 12 negative. Sugar was present from the third to the fifth day.
3. The result in the cases of the 12 nursing patients was negative.
4. The character of the sugar was demonstrated, 1st, by elimination—*i. e.*, urine which gave positive result with tests of Trommer, Nylander, and Rubne, gave negative results with the fermentation test. 2d, by transformation—*i. e.*, transforming lactose into galactose, which then gave positive results with fermentation.

SYMPHYSIOTOMY.

ZWEIFEL (*Centralblatt für Gynäk.*, 1893, No. 22) gives the following report on the results of symphysiotomy: The later statistics of Morisani give, in 55 operations, 2 maternal deaths and 3 dead children. In his own experience in the Leipzig Klinik, he had a total of 14 symphysiotomies, 12 reported by himself, 2 by König and Abel. The maternal results were all favorable. Of the children, one died from asphyxia and one from pneumonia two days after birth. The forceps was applied ten times, but always when the head was low in the pelvis. After section of the skin a finger was always placed in the pre-vesical region, behind the symphysis, in order to protect the bladder and cover the knife. After complete section, the joint separated $\frac{1}{2}$ cm.; after cutting the ligamentum arcuatum there followed widening of the space a finger's breadth. Any hemorrhage encountered was best controlled

by tampons of iodoform gauze. In some cases with narrow pelves the joint widened 6.5 to 7.5 cm. during the birth of the head. There was bony reunion of the joint in his last eleven cases. He regards it as unessential that an assistant make strong pressure on the trochanters. The pubic joint can be brought together by placing the patient on her left side, the legs being straightened. After cleaning the wound, he always places a drain in the lower end. In the course of three cases in which silver wire was used in suturing, incontinence of urine appeared, from an irritation of the bladder from the suture. Catgut had no such results. He finds a small increase of the transverse pelvic diameter in those recovered after symphysiotomy. Those cases with frequent attacks of fever were unfavorable, but only three had distinctly bad puerperal periods. The lacerations of the soft parts were usually severe. Of such he had four cases, of which three were primiparæ. Useless spreading of the pubic joint is best controlled by spontaneous birth. Where high temperature does not make its appearance symphysiotomy generally has a favorable termination.

SYMPHYSIOTOMY FROM AN ANATOMICAL STANDPOINT.

DÖDERLEIN (*Centralblatt für Gynakologie*, 1893, No. 22), after an anatomical investigation of symphysiotomy, reports that the sacro-iliac joint is not an immovable articulation; it permits great movement without wounding. Separation of this joint amounting to more than six cm. is apt to be followed by rupture of the sacro-iliac ligaments, more on the right side than on the left. Without infection, wounds of this joint heal easily and completely. He finds after symphysiotomy an asymmetrical increase of width in the pelvis caused by the right ilium giving way more than the left. After examination of a number of cases, he finds that for each cm. of spreading of the pubes after section there is an increase of about 8 cm. Where the pubic joint shows a separation of 6 cm. there is a total increase of space of about 50 cm. = 150 per cent. over the pelvis before operation; this increase of space extends through the entire pelvis.

OLHAUSEN (*ibid.*) gives his experience in two cases of symphysiotomy. In the first, a woman with highly contracted pelvis, died in eclamptic coma twenty-four hours afterward. The child was delivered by forceps. In this case he endeavored to use silkworm gut for suturing, but a layer of bone over the pubic joint prevented. In the second case great difficulty was experienced in cutting through the symphysis and in delivering the head. In this case silver wire was used to unite the pubic joint; the same difficulty was experienced as in the former case. In both operations he had the greatest anxiety lest the soft parts should be entirely torn apart. Incontinence of urine followed, although the urethra was intact. The writer concludes, after these two operations and some investigations on the cadaver, that not more than two centimetres separation of the pubic joint follows the simple dividing of the articulation itself; while by section of the ligamentum arcuatum inferius the joint will separate to the extent of 5 to 6 cm.

KOFFER (*ibid.*) cites one case of symphysiotomy in which the articulation healed after three weeks. He exhibited an apparatus for holding the joint together after the operation has been performed. He does not consider the

holding of the trochanters by an assistant necessary. In his fatal case there was a phlegmon of the pelvic tissues present; but section showed that except that the pubic joint was somewhat more movable than before, in all other respects was it intact.

LEOPOLD (*ibid.*), after four cases of symphysiotomy, concludes that it is not an operation for general use. It should only be done when the conjugata vera is 8 cm.; for when a large diameter exists spontaneous birth can in time take place. Version should also be tried. The membranes should be kept intact as long as possible. In primiparæ symphysiotomy should very seldom be undertaken.

CHROBAK (*ibid.*) regards the wounds of the soft parts as more dangerous after symphysiotomy than the injury to the symphysis. Where sewing of the joint was necessary he has used, in his later cases, steel pins overlapped with thread. He has found fever often present, and has lost one case by it.

PROLONGED DELIVERY.

TOUVENAIN (Centralblatt für Gyn., 1893, No. 22) reports the case of an embryotomy done after version, in which parts of the foetus were removed during three days, the head being left in the uterus. After the patient had resumed her occupation, a discharge persisted, and upon consulting another physician it was found that a utero-vesical fistula existed. It was also found that the skeleton of the entire foetal head still remained in the uterus. After much difficulty dilatation was completed by the use of laminaria, and the foetal bones extracted with forceps. The woman finally recovered.

PÆDIATRICS.

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THE PERIOD OF CONTAGIOUSNESS OF MUMPS.

RENDU (Société Médicale des Hôpitaux, séance of February 10th, *Revue mensuelle des Maladies de l'Enfance*, March, 1893, p. 124) reports two cases coming under his observation which throw some light upon this question. In one case an adult had contracted the disease after visiting a relative in whom it did not become manifest until a day after the visit. The second patient, a child of ten years, had also become infected from a person in whom the disease was still latent. These facts show that the contagion of mumps manifests itself at the end of the period of incubation, and that transmission

occurs through the expired air. The maximum of virulence of the germ appears to be in the first forty hours of invasion, but this does not assure the absence of virulence during the following days. According to the present practice of quarantine in this disease, school-children are not permitted to return to school for three weeks after their cure, which entails a month of loss for an illness of eight days' duration, while immunity to other pupils is not thereby assured, and the diffusion of the epidemic is not suppressed. At the time that the disease declares itself, it can be presumed that in the preceding forty-eight hours the child has succeeded in infecting his neighbors. On the other hand, it is more than probable that after four or five days of the disease, and especially after the disappearance of the swelling, the contagion no longer exists. It therefore seems to the author that this quarantine of three weeks can be properly shortened, since it does not prevent the diffusion of the disease, which is accomplished largely at a time when the diagnosis is impossible. He believes that measles comes properly within the same category.

ARTERIAL OBSTRUCTION IN THE COURSE OF TYPHOID FEVER IN A CHILD.

SALLÈS (*Lyon Médical*, 1893, No. 3) reports the case of a child of eleven years, who, on the eighteenth day of a typhoid fever, was suddenly seized with severe pain in the upper inner part of the right thigh, which showed neither œdema, deformity, nor inguinal adenitis. The temperature of the limb was sensibly inferior to that of the corresponding member. No pulsation was detected in the femoral, the popliteal, the posterior tibial, or the dorsalis pedis arteries. No sensation of a hard cord was felt in any accessible portion of the femoral. On succeeding days the member became colder and cyanotic, while blueness and violaceous marblings appeared upon the dorsum of the foot. The pain persisted, and the arterial pulsations were completely suppressed. The limb was uniformly swollen, but presented no œdema. Gangrene, which seemed inevitable, did not, however, supervene. Little by little the warmth returned, pain subsided, and the parts returned to a natural condition. During this time the temperature followed the normal course, and took a regular descending curve. Two months after the beginning of the complication pulsation reappeared in the femoral artery. The author rejects the idea of embolism, the heart not having been affected at any time in the disease, and, with less obvious reason, disposes of the question of thrombosis. He attributes the phenomenon to a primitive arteritis occasioned by the bacillus of Eberth or other micro-organisms.

TREATMENT OF PULMONARY TUBERCULOSIS BY GUAIACOL INJECTIONS.

LAPLANCHE, in a Paris thesis of the present year, describes this method of treatment of a number of children suffering from pulmonary tuberculosis of the second and third degree. The results were in general satisfactory, and serve to confirm those obtained by various observers with both guaiacol and creasote, which latter contains 90 per cent. of guaiacol. The solution employed was composed as follows: Guaiacol, 0.05 gm.; iodoform, 0.01 gm., to oil of sweet almond, sterilized, 1 c.c. The hypodermic injections were made with a Roux syringe containing 5 cubic centimetres, all the parts of which

had been carefully sterilized. The region of injection, usually the buttock as being the most convenient and the least painful, received first a cleansing with soap and then with a solution of bichloride, 1:1000. The needle was plunged in deeply, and the injection made very slowly; after each injection a prolonged massage of the part was practised to favor the absorption of the liquid. Injections were made daily; commencing with 10 to 20 centigrammes, a dose of 1 gramme daily was reached.

Under these conditions, the change in the general condition was rapid and noticeable with all the patients. From the first week of treatment the pallor of the face disappeared; from being sad, taciturn, somnolent, indifferent to surroundings, the child resumed his happy disposition. The night and day sweats ceased in most of the cases; digestion became more easy; drowsiness after eating disappeared, and sleep became more regular and refreshing. Fever diminished little by little till it completely ceased. Expectoration became less difficult, cough lighter, oppression disappeared, and a progressive increase in weight became manifest.

Of forty-nine patients, in two cases only was this improvement not produced by the guaiacol treatment. Coincidentally with the increase of weight the bacilli diminished notably, but did not completely disappear.

TREATMENT OF MYXŒDEMA IN CHILDREN BY EXTRACT OF THE THYROID GLAND.

REHN, of Frankfort ("Transactions of the Twelfth German Congress of Internal Medicine," *La Médecine Moderne*, 1893, No. 33, p. 425), reports three cases of typical myxœdema in children, in none of whom could the least trace of a thyroid gland be found. In one case the author's brother, taking advantage of an operation for goitre which he had just finished, implanted in the thyroid region a portion of normal thyroid tissue. In the course of the operation he was able to assure himself of the absence of the slightest trace of the gland. The other two children received by mouth an extract of the thyroid gland of the sheep; these glands were carefully bruised with glycerin and water. For several months these children took twice daily ten to fifteen drops of this extract, and up to the time of reporting had taken two and two-thirds glands. Within the given dose no unfavorable effects were observed. Under this treatment the author saw the myxœdematous infiltration disappear; the children became active again; their hands became warm, appetite improved, weight decreased; the skin became smooth and resumed a normal coloring; the expression of hebetude disappeared, perspiration reappeared, and the stools became more regular. Growth was apparent, and during the treatment of two months these children grew three centimetres.

The child in whom the morsel of thyroid was engrafted presented also a like amelioration with the gradual absorption of the mass.

Hoffmann, of Leipzig, reported a similar result in a case in which the extract was used.

PATHOLOGY AND BACTERIOLOGY.

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THE ETIOLOGY OF PURULENT MENINGITIS.

THE investigations of A. Fraenkel, Foà and Uffreduzzi, Weichselbaum, Netter, and others have shown the unmistakable and very frequent etiological relationship of the diplococcus pneumoniae to purulent leptomeningitis. In about 60 per cent. of the cases this germ has been found as the only pathogenic micro-organism present in the exudate, the streptococcus pyogenes and the diplococcus intracellularis meningitidis of Weichselbaum being the species next in frequency in the disease.

The point of entry of these germs into the cranium has excited no little speculation, as in the majority of the cases the meningitis appeared to originate independently of any other suppurative lesion; in a few, otitis media was the evident source of the infection. Latterly Weichselbaum has announced his belief that the source of infection in many of these cases lies in the nasal cavity and its adjoining sinuses, and substantiates this opinion by the report of a number of cases where an inflamed nasal mucous membrane contained the same micro-organisms as those found in the associated meningitis.

Another case of this nature has recently been reported by ZÖRKANDÖRFER, from Prof. Chiari's Pathological Institute in Prague (*Präger medicinische Wochenschrift*, 1893, No. 18, p. 211). The clinical history presents only the ordinary symptoms of an acute purulent leptomeningitis. At the autopsy, cultures made from the inflamed meninges and from a suppurative inflammation of the mucous membrane of the sphenoidal sinus and upper portion of the pharynx proved the presence in both of the diplococcus pneumoniae, which was also found in the blood of many of the internal organs. Its virulence was shown by animal inoculations.

The author, consequently, regards the meningitis in this case as a direct extension of the suppurative process from the nasal cavity, and announces it as his opinion that in many cases of so-called idiopathic meningitis a similar avenue of infection might be discovered.

PAGET'S DISEASE OF THE NIPPLE.

IN 1874 Sir James Paget described a peculiar condition of the breast characterized by superficial excoriation beginning at the nipple and gradually invading the surrounding skin, resistant to all treatment, and usually associated with a carcinomatous mass in the other breast. The exact nature and cause of this malady has been the subject of much speculation and investigation, some advocating the view that it is nothing more than an unusual form of epithelioma, others accepting Darier's theory that it is a parasitic disease

caused by a micro-organism of the psorospermia type, Darier having observed structures resembling psorospermia in cases of the disease.

A pronounced case has recently been described by SCHULTEN (*Nordiskt medicinskt Arkiv*, 1893, xxv., Häft 2), Professor of Surgery at the University of Helsingfors. A woman, sixty-nine years old, had for fifteen years suffered from a superficial moist excoriation of the right nipple and breast gradually spreading until two or three square feet of the skin of the right side were involved. A tumor removed eight years ago from the same breast showed the structure of ordinary glandular carcinoma. The axillary glands were not affected. Histological examination of the ulcerated tissue showed decided proliferation of the epithelial elements of the skin, but no penetration of the subjacent tissue, and many of the parasitic (?) forms described by Darier both in and between the cells. Psorospermia were also found in the deeper cancer.

Schulten considers the clinical picture presented by Paget's disease to be quite different from that of ordinary epithelioma, because of its softer consistence, its lesser tendency to ulceration, and the non-invasion of the subjacent tissue, though he admits that the microscopical structure closely resembles that of epithelioma. The presence of the so-called psorospermia is not conclusive, as they have been found in both conditions. He believes, therefore, that Paget's disease, though not identical with the ordinary epithelioma of the skin, is closely allied to that affection, and cites the varieties of tuberculosis of the skin in illustration.

CHOLECYSTITIS COMPLICATING TYPHOID FEVER.

CAREFUL study of a case of typhoid fever by PROF. CHIARI (*Präger medicinische Wochenschrift*, 1893, No. 22, p. 261) has added another to the long list of complications of that disease which have been shown to be directly caused by the bacillus of Eberth.

A boy, twelve years of age, died of what appeared to be an ordinary case of typhoid fever, complicated at the last by hypostatic pneumonia. At the autopsy, besides the usual lesions, a severe inflammation of the gall-bladder and surrounding peritoneum was discovered. In places the mucous membrane and portions of the wall of the gall-bladder were necrotic, and pus was mixed with the contained bile. The gall-ducts and duodenum appeared to be normal. The presence of the typhoid bacillus in the pus and in the inflamed wall of the gall-bladder was proven by cultures.

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ON SPORADIC CRETINISM IN AMERICA.¹

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THE studies which have given to the thyroid gland the dignity of an organ with diseases of capital importance have come from practising physicians, experimental physiologists, and from surgeons: studies which, "fitly joined together," have not only made clear some dark problems in pathology, but also have raised a reasonable hope in the treatment of a group of hitherto hopeless disorders.

A relation between myxœdema proper and cretinism was hinted at by Gull in the title of his paper (1873) "On a Cretinoid State Supervening in Adult Life in Women," and clearly appreciated by Ord, in 1877, in a fuller description of the disease, in which its connection with abnormal states of the thyroid gland was recognized. The remarkable cachexia found by the Swiss observers, Reverdin and Kocher, to follow certain cases of total extirpation of the thyroid, and the brilliant studies by which Horsley demonstrated the existence of an experimental myxœdema, threw a flood of light on the whole subject, and enabled the committee of the Clinical Society of London, in 1888, to reach the following conclusions: "That there is strong evidence that myxœdema, sporadic cretinism, endemic cretinism, cachexia strumipriva, and the operative myxœdema of animals are severally species of one genus; that such clinical differences as exist between them are due to causes already

¹ Read before the Association of American Physicians, May, 1893.

sufficiently set forth; and that the one pathological fact common to all these conditions is the occurrence of morbid processes or of operations involving the annihilation of the function of the thyroid body."¹

Having had at my clinic within a comparatively short space of time three cases of cretinism, and knowing that the subject of myxœdema was to be presented at this meeting, I thought the matter of sufficient interest to inquire as to the prevalence of the disease in this country. The report here made is based upon a careful search of the literature so far as it relates to the United States and Canada, and upon inquiries made of the superintendents of the Asylums for the Insane and of Institutions for Feeble-minded Children throughout the country, as well as of many friends.

As much misunderstanding exists as to the exact definition of a cretin, illustrated by the fact that at least one-half of the photographs sent me from different institutions did not belong to this type of idiocy, it may be well to define somewhat carefully the precise conditions to which this term should be applied. In the first place, there is no essential difference between the cases occurring in large numbers in goitrous districts and the sporadic cases. The term should be limited accurately to a form of idiocy associated with changes in or absence of the thyroid gland. The following statements are based upon the recent article of Horsley.² The important factor is the loss of the function of the thyroid gland, whether this results from congenital defect, progressive atrophy, or coarse changes which gradually annul its function.

1. *Congenital cretinism* is rare, and is usually associated with absence of the thyroid gland. The child rarely lives, but the changes presented are sufficiently distinctive for diagnosis. The supra-clavicular fatty tumors are well marked and the skin generally is thick and in folds. The limbs are short, the epiphyses swollen, while the shafts are much ossified. The skull is broad and short, the sutures open, and the basi-sphenoid junction is prematurely ossified, a point upon which Virchow laid great stress. This congenital variety may be difficult to distinguish from rickets. Degenerative changes, slow over-growth of the fibrous tissue, and a myxœdematous condition have also been met with.

2. *Ante-natal and subsequent slow development of cretinism.* Here the changes appear to have been initiated during foetal life, but are slight and scarcely noticeable at birth. "The infant shows no, or very slight, signs of intelligence, but the physical signs are less obvious. According to some, the majority at birth have a goitre, usually of about an inch in diameter; the body is large, with disproportionate head and hands, and, what is more important still in connection with the similarity

¹ Report of a Committee of the Clinical Society of London, to investigate the subject of Myxœdema. Clinical Society's Transactions, Supplement to vol. xxi. p. 199. London, 1888.

² Tuke's Dictionary of Psychological Medicine: art. "Cretinism."

to myxœdema, in many cases the subcutaneous tissues appear œdematous; occasionally, according to the severity of the case, there is also non-development of the facial bones, a flattened nose, giving a stupid appearance, and a large thick tongue. The neck is short and thick. It is obvious that under these circumstances we have the same condition as that described above, only much less severe; the further history of these cases shows that the destruction of the thyroid gland continues, and the symptoms develop into the worst form of cretinism, about to be described." (Horsley.)

3. *Development of cretinism in early childhood.* The infant may be perfectly normal at birth, develop naturally, and show no signs of disease until from the second to the fifth year. A majority of the instances of sporadic cretinism belong to this division. "The child from being bright and normal becomes gradually less and less intelligent, and at the same time the physical appearances which have been summed up in the conditions before mentioned begin to assert themselves. The child does not increase in height, the limbs similarly do not lengthen, but remain short and thick. The trunk is broad and thick, there being also well-marked lordosis, so that the abdomen is prominent. In like manner the neck is shortened, the skull broad, the nose *retroussé*, the lips thick, and the teeth very imperfectly developed. The speech, from being clear becomes thick, the voice is rough and at times stridulous, the physiognomy is placid to stupidity, the skin is coarse, the hair becomes scanty and thin. There is well-marked anæmia; the subcutaneous tissues have a peculiar kind of spongy or waxy feel, as if there were, so to speak, solid œdema occupying the connective fibres of the tissues.

"The condition thus produced reaches its height usually by the end of fourteen or fifteen years, so that by the twentieth or twenty-first year it has attained complete development, and thenceforward remains perfectly stationary until death. Hence, at the age of thirty the physical appearance presented is that of a young child, and the intellectual condition similarly does not advance beyond that of childhood." (Horsley.) A majority of the cases of which I shall speak and which are illustrated in this paper belong in this division.

The adult condition of cretinism as seen in cases which have developed slowly, and have reached the age between twenty or thirty and over, is very characteristic. This "pariah of Nature," as it has been called, is a being degenerate both physically and intellectually; short in stature and childish in appearance. The height usually does not exceed that of a child from five to seven years old. The skin is often rough, sometimes brown and stained, but in the sporadic cases more frequently of a chalky earthy hue. In certain instances the subcutaneous tissues are much infiltrated, so that the skin has a curiously waxy

hue. Supra-clavicular folds of a fatty and myxœdematous character are common. The hair may be thick, and is usually confined to the head, even in adults; but in some instances there are traces in the axillæ and on the pubes. The face has an aspect of dulness and stupidity, though sometimes in the sporadic cases it is bright and smiling. The lips are broad and thick and prominent; the nose is broad at the base; the nostrils wide; the alæ very broad and pass without any special division into the naso-labial fold. The eyes are widely separated and sometimes present strabismus. The eyelids are often œdematous. In advanced cases, though they see things, yet they see without any intelligence, and the expression of the eyes adds very much to the impassive, immobile aspect. The tongue is often thick, large, and may constantly protrude from the mouth. The skull is large in proportion to the body and to the face. It is broad, brachycephalic, the transverse diameter approaching that of the antero-posterior. It is flattened in the forehead and frequently depressed and sloping backward. The two halves of the head are often asymmetrical. The sutures are often occupied by Wormian bones. The neck is large and short, and the thyroid gland may be enlarged or may be completely absent. The thorax is usually deformed in association with lateral or antero-posterior curvature of the spine. The abdomen is prominent and full. The limbs are extremely short, sometimes emaciated, occasionally deformed by rickets. The muscles are feeble, the hands and feet are large, the fingers thick and broad, and the nails often coarse and large, and may be rudimentary.

There are varying grades of cretinism, and just as we recognize complete idiocy, imbecility, and feeble-mindedness, so there have been described three degrees of this affection: cretins, which present in a most advanced degree the physical characteristics above mentioned, and are in addition deaf-mutes with the vegetative functions alone active; semi-cretins, with mental dulness, harsh guttural voice, expressionless countenance, and the physical condition similar to but less pronounced than that of the true cretin; and lastly, the cretinoid condition in which there is some degree of enfeeblement of the intelligence, speech somewhat impaired, and the physiognomy and physical conformation is that of the cretin.

The recognition of the condition of cretinism, though easy in advanced and typical cases, is often, I find, not clearly made: I judge this from the number of descriptive cases sent to me as instances of this condition, but which in reality have been cases of various forms of idiocy. The important criteria are the physiognomy, the shape of the head, the stunted growth, and the condition of the connective tissues. The mental deficiency is less characteristic, presenting nothing not seen in instances of ordinary idiocy. The condition of the thyroid is uncertain. There

are cretins with and cretins without goitre, while in others the gland seems entirely absent. The most satisfactory diagnostic feature is the condition of the skin and connective tissues, which, as Horsley suggests in the following words, should form really the basis of the classification. "By excluding all cases in which the appearance of idiocy is not accompanied by any noteworthy changes in the skin or connective tissues we obtain a considerable delimitation of the condition which we ought to call cretinism, for by adopting such a plan of differentiation we necessarily leave out all cases due to direct injury or disease of the central nervous system, and which are included in the conditions classed by various writers under different headings, such as congenital idiocy, idiocy following encephalitis, idiocy coupled with porencephaly, etc., all being cases where we have destructive lesions or non-development of the central nervous system, especially of the cerebral hemispheres, and in which, therefore, we have a simple and direct destruction of the intellectual mechanism. Although such conditions may be naturally accompanied by want of development in the parts of the body which may happen to be paralyzed, etc., still there is no direct or certainly no general change in the connective tissues throughout the whole system, and secondarily in the nervous system, such as furnishes the basis of the present classification."

The pathology of the disease requires to be studied in the light of the more recent researches. In endemic cretinism the thyroid gland is very commonly enlarged, but in all probability functionless, and the intimate relation of the condition to goitre, particularly the marked influence of heredity as shown in the fact that goitrous parents are more likely to have cretinous children, shows the close interdependence of cretinism upon conditions of the thyroid. In the sporadic cases the thyroid is usually absent, and in all probability the progressive changes in the connective tissues, including the bones, are associated in some way with the absence of the function of this gland.

HISTORICAL.—References to the existence of cretinism in America are found in Hirsch,¹ the *Dictionnaire Encyclopédique² des Sciences Médicales*, the *Nouveau Dictionnaire*, in the *Index-Catalogue of the Surgeon-General's Library*, and in the *Index Medicus*. Hirsch states that "Cretinism does not appear to be at all common except at a few points in all this region; at any rate it is stated by Barton that cases of it are rarely met with in the United States. Brown speaks of its occurrence in the valleys of Vermont; in Kneeland's account of the health of Massachusetts (for which State I have been able to learn nothing of the occurrence of goitre), it is stated that there are at least twelve hundred idiots and

¹ Handbook of Geographical and Histological Pathology, vol. ii. (New Sydenham Society's translation).

² Art. "Crétinisme," by Baillanger and Kreishaber.

cretins in a population of about one million. Praslow also has observed somewhat frequent cases of cretinism among a tribe of Indians living near Cape Mendocino, in California, as well as among the Spaniards in the mountainous parts of Southern California." These statements of Hirsch pass current in various works; thus Bury, one of the latest writers on the subject, in the *Cyclopædia of the Diseases of Children*,¹ says: "In North America cretinism is not common except at a few points, namely, in the valleys of Vermont, in Massachusetts, and in California." When we turn to the original sources for these statements, nearly all of which antedate 1850, we find, for example, the authority for the occurrence of the affection in Massachusetts the general statement of Kneeland,² that there are twelve hundred idiots and cretins in a population of one million. I can find no detailed observation in this article, and the term 'cretin' was probably used in a loose way to indicate some variety of imbecility. So far as I can ascertain, the statements as to the existence of the disease in Vermont and New Hampshire rest on a paragraph in Buckminster Brown's article on cretins in Switzerland:³ 'Simpletons or idiots are to be met with in the valleys of Vermont, New Hampshire, or Scotland.' There is no reference to cretinism in Dorr's⁴ account of the prevalence of goitre in the valleys of the Green Mountains. Trask, of Windsor, Vermont, speaking of the prevalence of goitre among the early settlers in the valleys, says: "In most countries goitre is connected with a species of mental imbecility called cretinism; but in the United States, thanks to God, it is a mere corporeal affection."

Praslow's account of the occurrence of cretins in California I have not seen, but I have letters from several correspondents in that State who know nothing of its existence at present, while in the State Insane Asylum, at Stockton, Dr. Hoisholt tells me, there are only two cases.

Barton,⁵ whose essay on goitre, published in the year 1800, is one of the few systematic attempts to study the distribution of this disease in America, states: "I have heard of some cases of cretinism among the Indians inhabiting the neighborhood of Sandusky. But such cases are undoubtedly very rare in North America. This circumstance, as I have remarked, is well calculated to show that goitre and idiotism are not necessarily connected with each other."

Here and there one meets with the assertion that cretinism occurs in Lower Canada among the French, but I have not been able to trace the allusion to its source or to verify the fact of its existence. Some years

¹ Vol. ii., art. "Cretinism."

² AMERICAN JOURNAL OF THE MEDICAL SCIENCES, April, 1851.

³ Ibid., 1847, ix. p. 111.

⁴ New York Medical Depository, x.

⁵ Benj. Smith Barton, Professor of Materia Medica in the University of Pennsylvania. "A Memoir Concerning the Goitre as it Prevails in Different Parts of North America." Pp. 93. Philadelphia, 1800.

ago I looked through two of the large institutions for children in Montreal, and the Longue Pointe Asylum, without finding any, and two cases supposed to be cretins, at Cacouna, proved to be remarkable rhachitic dwarfs.

The more recent literature descriptive of cases is also very scanty. Jacobi, in the *Hospital Gazette*, N. Y., 1879, vol. v., described briefly a case, the first on record in this country—a child of eight years. Johnson's paper, in the *Detroit Review of Medicine*, January, 1873, contains no statements about cretinism in America.

Last year two cases were reported; one by Lloyd,¹ from the Philadelphia Hospital; the other by C. W. Townsend,² of Boston. Huber, in the discussion on Townsend's case, stated that the disease was not very uncommon among the children "in the tenement districts of New York, owing to the influx of immigrants," but no definite data are available as to the facts of its prevalence.

ENDEMIC GOITRE.—Endemic cretinism occurs only in localities in which goitre prevails extensively, and the above observations, which have led in Europe to statements as to the prevalence of it here in endemic form, have been based in reality upon incidental references to, and studies upon, goitre, made for the most part in the early part of the century. So far as I can learn, the disease has not and does not occur endemically in this country. It may be interesting to note certain facts about goitre which I have gleaned in my inquiries, but which, however, refer to this malady only so far as it might be related to the existence of cretinism in a locality. Hirsch³ is again our chief authority as to its prevalence; and, as he remarks: "Our information on the endemic occurrence of goitre in North America belongs for the most part to the early years of this century and is very fragmentary." Barton's memoir already referred to, and the articles of W. Gibson⁴ and of Mease⁵ contain the most authentic information as to its prevalence, from which subsequent writers have drawn their information. Without entering into details which are available in Hirsch's work, it may be stated that goitre has been described as prevailing among the French Canadians along the Detroit River, and along the Richelieu River between St. John and Montreal; in the valleys of Vermont and New Hampshire; in the central parts of New York about the smaller lakes; in Central Pennsylvania; in the mountainous districts of Maryland, Virginia, and the Carolinas; and in Alabama. From a majority of these localities we have no recent observations. I have written to a number of physicians in the towns of New England mentioned by Dorr⁶ as very much

¹ International Clinics, vol. II., series 2.

² Archives of Pediatrics, Nov. 1892.

³ Op. cit., p. 149.

⁴ The Philadelphia Journal of the Medical and Physical Sciences, vol. I., 1820.

⁵ American Medical Recorder, Philadelphia, 1818.

⁶ New York Medical Repository, 1806.

affected, and so far have had only negative answers. Thus Dr. R. Clark, writing from Windsor, Vermont, one of the towns mentioned by the early writers, says that in the past fifty years he has not heard of its being very prevalent; and Dr. Emerson, who formerly practised at Chester, Vermont (a town one-half of the inhabitants of which were stated by Dorr [1806] to be subjects of goitre), writes that "During seven years' residence in Vermont I do not recall seeing more than three or four cases of goitre, and I do not think that it prevails to any special extent." Dr. R. J. Preston, of the Southwestern Lunatic Asylum, Marion, Virginia, has very kindly made inquiries as to the existence of the disease in some of the southwestern counties of that State, in which, as stated in Gibson's *Surgery*, the disease formerly prevailed, and here, too, it seems to have almost disappeared. Dr. W. Taylor, of Talladega, Alabama, who is the authority quoted by Hirsch in support of the statement that there is a "good deal of it" in the northern counties of that State, writes (1893): "Since that time [1854] my views on the subject have been greatly modified. With a much larger population there are now really fewer cases of goitre to be found in Talladega and adjacent counties than in the earlier period of their history The fact remains that there has been a great decrease in the prevalence of goitre during the past thirty years, and the percentage of cases will not surpass the average in other States and communities."

In the Province of Quebec cases of goitre are by no means rare, and in Montreal the disease is certainly more frequent in hospital practice than in Philadelphia or Baltimore. I have no information of any localities in which it could be said to be endemic, attacking a very large number of persons.

In the neighboring Province of Ontario, in the limestone regions at the end of Lake Ontario, the disease is very prevalent. In response to my inquiry about cretins, Dr. C. K. Clark, of the Kingston Asylum, mentions the extraordinary prevalence of the disease. Thus in an asylum population of about 600 there are 288 cases of goitre. He writes:

"The goitres are generally developed when the patients are admitted to the asylum, and it is rarely indeed that we see recent cases unless among the employés. After studying the subject carefully I have come to the conclusion that Eastern Ontario is a distinctly goitrous district, and I do not believe that outside practitioners have given the matter any attention. It is difficult to get accurate statistics even from asylums, and for this reason I have never published the returns sent in from nearly every hospital for the insane in America. A superintendent would answer my circular and state that his institution was without goitrous patients. I would go to his institution myself and probably find twenty or thirty goitres. The inference was plain, and when insti-

tutions side by side gave returns showing marked differences the inference was plainer still.

"Outside practitioners about Kingston have written nothing of interest in connection with the subject, but I find goitre prevalent even among the lower animals; most of the curs about the asylum have goitres, some of them so large that anyone can notice them. The tendency to this disease seems to run in certain strains, and the young of some families of dogs and horses are invariably goitrous. In two cases of human beings goitres have proved fatal through pressure. At one time I was inclined to believe that mental disease might be the factor determining the presence of goitre in so many of our people, but am now convinced that this alone will not account for the condition of affairs at the Kingston Asylum. The goitres met with in the insane are almost invariably incurable, probably because of long standing. Those occurring in employés are easily cured by ordinary methods of treatment. With some there seems to be a hazy idea that people coming from about Loughboro Lake have goitre more frequently than others in this district. There is nothing to show that such is the case, and the disease seems to be common and widespread throughout Eastern Ontario."

There are no cases of cretinism in the Kingston Asylum.

Altogether, the evidence at command favors the view that in the regions of Virginia, Alabama, and Vermont in which goitre was formerly endemic, it is now very rare.

Endemic cretinism does not exist, we may say, in the United States or Canada, nor is it at all probable, from what we can learn, that it has ever existed. My inquiries have not extended to Mexico, nor, indeed, to New Mexico, in which it is stated that both goitre and cretinism occur.

SPORADIC CRETINISM.—Independently altogether of the occurrence of endemic goitre, cases of cretinism are known to occur here and there in all civilized countries, and the inquiries which I have made in this country relate particularly to the existence of this form of the malady. Its rarity may be gathered from the fact that up to date, so far as I can ascertain, there have been but three cases put on record. My attention having been called to the subject by the appearance in rapid succession of three cases at the Johns Hopkins Hospital, I thought it would be of interest to the members of the Association, particularly in connection with the discussion upon myxœdema, to ascertain somewhat more accurately the prevalence of the disorder. Accordingly I sent out letters to all the asylum superintendents in the United States and Canada, and to the various institutions for feeble-minded and idiotic children, asking information as to the existence of the disease. I wrote also to physicians practising in various localities in which it had been stated that goitre prevailed endemically. Among the replies which I received

were descriptions of many cases of idiotic children which were evidently not cretins; but, in addition to the hospital cases I have referred to, there were eight well-characterized examples, the description of which will be given. In addition, from various superintendents there were statements as to the existence or occurrence of five or six other cases. The interest in the subject is at present a very practical one, inasmuch as the observations on the beneficial effects of thyroid feeding have been shown in several cases, particularly in those seen within the first three or four years of life. I have at present two cases under treatment, but both for such a short time that it is impossible to say as to the changes in the condition.

CASE I.—M., aged (now) two years and three months, was brought to me first from the Eastern Shore of Maryland, January 10, 1892. The parents (first cousins) are healthy and strong. No hereditary ailments on either side; no members of the family have had goitre. The patient was the second child; the labor was easy, and she thrived well. Nothing special was noticed about the child until the end of the first year, when it was suspected something might be wrong, as she had not cut her teeth, and did not attempt to walk or to talk. Throughout her second year she grew fairly well, but had several attacks of slight fever, and did not develop as other children, making no attempts to crawl or to walk, and seemed unnaturally quiet and dull. She did not cut the incisor teeth until she was nearly two years old. Within the past six months she has changed remarkably in color, has become very pale and waxy, and the face and limbs seem puffy and swollen. She has taken milk well, and has developed a little mentally; smiles, and attempts to repeat her own name when it is said, and has learned to say "mamma" and "papa."

Present condition. Under-sized child for her age. Aspect is very striking; color, pale; face, very broad across; the mouth is open; tongue protrudes, and is evidently enlarged; the lips are full and heavy; the cheeks very large, almost pendulous; the hair is long and straight; the eyes are blue; the sclerotics very pale; the eyelids glossy and infiltrated. The forehead is large, not badly shaped; the head well formed, rather prominent behind; the anterior fontanelle is not quite closed. She looks good-tempered, but takes very little notice, and smiles in a feeble way. The facial aspect is that of a cretinoid idiot.

The muscles of the arms are feebly developed; the subcutaneous tissues are much infiltrated; the hands are swollen and glossy—not tense, and look œdematous, but the infiltration is firm, and only yields on prolonged pressure. The legs look large; the thighs present several folds; the skin looks glossy, and the subcutaneous tissues are much infiltrated. The skin over the dorsal portion of the feet is very glossy and tense, and on firm pressure pits with distinctness. The abdomen is distended and the superficial veins prominent. Palpation is negative; the edge of the liver is palpable about six cm. below the costal margin. The edge of the spleen is not palpable, nor does the organ appear to be enlarged. The thorax is well formed; no trace of rickety enlargement of the ends of the ribs; no evidences of

rickets in the long bones. The apex-beat of the heart is just within the nipple line. There is a systolic murmur with the first sound, which is loud and intense at the pulmonary cartilage; the breath sounds are clear. There is no enlargement of the superficial lymphatic glands; the thyroid gland is not enlarged; the cricoid cartilage can be well felt, as can also the entire trachea as low as the sternum, and it can be taken between the two fingers quite plainly. Dr. Halsted thought he could feel the thyroid beneath the sternomastoid muscle. The percussion note on the first bone of the sternum is clear. The examination of the blood showed a moderate increase of leucocytes and some irregularity in the size of the red blood-corpuscles.

The condition was diagnosticated as sporadic cretinism. As it was evident that the blood condition of the child was very much below par, she was ordered the syrup of the iodide of iron.

March 1, 1893. Patient brought again to-day. In the year and two months which have elapsed since I saw the child she has improved remarkably. She is now three-and-a-half years old. Her height is 75 cm. She looks more intelligent, takes more notice, and the facial expression is decidedly brighter. She tries to say a few words, and has begun to walk with a little assistance. The most striking changes are the disappearance in great part of the anæmia and lessening of the firm subcutaneous œdema which was so marked a feature. She still has a little infiltration about the eyelids and cheeks. The limbs also look full, and they are firm. The skin is a little glossy over the hands and feet. The tongue does not protrude so often from the mouth, though when the face is in repose it is frequently seen protruding slightly. The face looks broad and full, and the expression and aspect is still cretinoid; Head is 51.5 cm. in circumference, the abdomen 54.5 cm. The neck is thick and short, and presents a large transverse fold of fat. The thyroid gland is not palpable, and below the thyroid cartilage the trachea can be felt with the greatest distinctness and grasped between the fingers down to the sternum.

The favorable reports from cases of sporadic cretinism treated with the thyroid extract encouraged us to try it in this case, and the child has been taking the glycerin extract of the sheep's thyroid in an amount corresponding to about a quarter of a gland in the twenty-four hours. No special change is as yet noticed after nearly a month's treatment.

CASE II.—Emma —, aged nineteen years; brought to the Johns Hopkins Hospital by her mother, March 3, 1893. The family history is good; parents are not blood relations; no thyroid enlargement; no history of mental troubles. Patient is the second child; delivery was not instrumental; she was healthy when born; fat and well; nursed for nearly a year, and it was not until the end of this time that it was noticed that she was backward in development. She did not seem to grow and thrive as other children, though she took her food well, and was in other respects quite healthy. For several years it was thought that she was completely idiotic, as, though she took notice and seemed to know what was said to her, she did not walk or talk, but had to be held in the lap, and the tongue was constantly protruded from the mouth. She did not begin to cut her teeth until the third or fourth year. They decayed early and rapidly, and her second dentition did not begin until she was past her twelfth year. The anterior fontanelle did not close until after her eighth

year. She did not begin to walk until her twelfth year. She has never learned to read or to write.

Present condition. Her height is three feet nine inches. She walks readily; the feet are turned out a little, and there is a somewhat waddling, uncertain gait, with the hands spread. The face has the characteristics of a cretin. The expression is pleasant; she smiles brightly, and looks good-natured, but has a childish, somewhat silly expression. She sits quietly, as a rule, with her mouth shut, but sometimes the tongue protrudes between the lips. The face is broad, and all the features thick and coarse. The nose is *retroussé*, the nasal orifices very apparent, and the alæ thick, and measure across the margins fully 5 mm. in thickness. The lips are thick and full; the cheeks prominent, large, and broad. In the upper jaw the lateral incisors are absent; the central incisors are of fair size, the enamel much eroded; the canines are small, also with defective enamel. The premolars and molars are small and much decayed. In the lower jaw the teeth are all present, but they are irregular and show the same character of defect. The roof of the mouth is much vaulted, the palate is not defective. The forehead is full, a little prominent in front; the head is long; the occiput projects, and it is broad immediately behind the parietal eminences. The occipital arches are much developed, and there are thick ridge-like projections at the line of the squamoparietal sutures. The circumference of the head is 54½ cm.; from the tip of one ear to the tip of the other, 27 cm.; from the occipital protuberance to the glabella, 38 cm. The ears are well formed.

The neck is 36 cm. in circumference. The thyroid gland is distinctly enlarged; the left lobe more than the right. The hands and arms are well formed; there is no enlargement of the epiphyses. She uses her fingers well, and can feed herself and pick up small objects, but the movements are somewhat clumsy, and she is unable to dress or undress herself. The legs are firm and strong; not bowed. The gait is as above mentioned; she falls easily, and, as her mother expressed it, has no elasticity. She is flat-footed. The knee-jerk seems slightly increased. The body looks squat and full; the thorax is capacious; the back shows a moderate antero-posterior curvature. The abdomen is large. Examination of the thoracic and abdominal organs negative.

She is well nourished, and the subcutaneous tissues are firm but do not pit, and there is no appearance like that of myxœdema; it is only in the thickness of the features that the condition is suggested.

She talks a great deal; the voice is high-pitched, very difficult to understand. Some words she speaks clearly, and she talks and behaves very much as a child of two or three years. She is easily amused; showed with great pleasure and childish joy a little new ring, and is very fond of pretty things. She has a very good musical ear; can sing several little songs. She is very good-hearted and generous, and always very anxious, if she has anything nice, that the servants, who are devoted to her, should share it. She is, however, self-willed, and does not like to be thwarted. She began to menstruate eighteen months ago.

CASE III. (Dr. Booker.)—Minnie R., white, aged three and one-half years, came to Johns Hopkins Hospital Dispensary November 25, 1892. She was born in Lebanon, Pa., and lived there until one year ago, when she was moved

to Steelton, Md. Born in natural labor; mother had only three hard pains; was a fat, healthy child up to second summer; when one year old, had summer diarrhœa, about sixteen stools daily for a month; after that the bowels became regular, and the child improved for a short while, then began to waste again without anything to account for it. She had no cough, no fever. There appears to have been no growth and no improvement since the attack of diarrhœa at one year of age; excepting the slight improvement which came on soon after the diarrhœa had been relieved, and lasted a short time. Parents are healthy, and no hereditary tendency. Mother has a younger child living and healthy; she never had a miscarriage. The child was brought to the dispensary on account of an almost constant crying, which had existed for three months. Appetite good; bowels regular; no fever; sleeps well.

Present condition. Child is thin, but not emaciated; is pale, with yellow tinge. Skin is dry, scaly, inelastic, in great folds, and appears much too large for the body. Numerous small lumps can be felt under the skin over the abdomen. Face has an idiotic or stupid expression; lips thick and coarse; tongue broad and thick, and protrudes a little between the open lips: child has only the four central incisor teeth, which are already decaying and nearly black. (The two lower incisors were cut in August, when one year of age, and just before the diarrhœa commenced. The following October was the time of slight improvement in the general nutrition of the child, and at this time the two upper incisors were cut; since then she has had no other teeth.) The nose is flat and broad; forehead low, and the head covered by thick, coarse, chestnut-colored hair. Strabismus in both eyes; fissures of the eyes very small. There is some enlargement in the neck in the region of the thyroid gland, but it is not certain that it is the thyroid. Also a thickening behind the sterno-cleido-mastoid over the clavicle. The limbs appear relatively short; they are thin, and the skin is very loose and in great folds over the limbs. Hands are large, spade-like, and the skin rough and in folds over the hands. Right wrist has been slightly œdematous for several days. Abdominal organs do not appear to be enlarged; spleen not felt. Lymphatic glands of body enlarged. Weight, twenty-seven pounds; length, 69 cm. Temperature, 98.4° in rectum. Child cannot walk nor talk; mother said it could say "mamma" and "papa," but the child does not look intelligent enough for that. Blood examination: normal amount of white elements, some of which contain pigment; crescents and cellular bodies found.

The child was under observation until February, 1892. She was treated with quinine and arsenic, and for a while appeared to improve; she was able to sit up, which was more than she could do when brought to the dispensary. When last seen at the dispensary, February 10, 1892, she had about lost what had been gained, and was pretty much as when we first saw her.

The mother said the child had got all its growth in the first year, up to the time it had the diarrhœa; that since then there appeared to have been absolutely no growth.

CASE IV. (Dr. Rotch and Dr. Bullard.)—G. S., female; aged six years, American, parents not blood relations, not the subject of goitre. Does not speak; mental condition is much enfeebled. Circumference of the head is 46.5 cm.; measurement from occiput to roof of nose, 34.4 cm.; across the

head from external meatus to external meatus, 29.3 cm. There is the general condition of infiltration like myxœdema of the skin. The thyroid gland is not to be felt. Circumference of thorax is 40 cm. The bones are somewhat enlarged about the epiphyses. The front teeth are good. (This case will be published in full by Dr. Rotch.)

CASE V. (New York Custodial Asylum for Feeble-minded Women: Dr. Brownell.)—Sarah McG., aged nineteen years, American, parents temperate. She is 86.5 cm. in height; weight, 41 pounds. The complexion is sallow;

FIG. 1.



FIG. 2.



Case V. Sarah McG., aged nineteen.

voice discordant, harsh. She sleeps well; is good-natured, and is seldom ailing; is a great favorite in the household. Largest girth of head, 52 cm.; from nose to occiput, 35.5 cm.; from ear to ear over vertex, 26.7 cm.; girth of neck, 29.3 cm.; girth of chest, 54.5 cm.; girth of abdomen at umbilicus, 62.5 cm. The abdomen is protuberant and the chest is narrow; the legs are perfect, but the knees incline inward. The flesh of the hands and feet looks old and wrinkled; the teeth are a good deal decayed and notched. There seems to be complete atrophy of the thyroid gland; there is fulness in the supra-clavicular fossæ; there is marked curvature of the spine, both lateral and antero-posterior.

CASE VI. (Indiana School for Feeble-minded Children: Dr. Van Swer-

ingen).—Louisa S., aged fourteen years, born in America, parents not related, no goitre in the family; nationality German. Height, 110.5 cm.; circumference of head, 56 cm.; from occiput to root of nose, 33 cm.; from external meatus to external meatus, 26.7 cm.; circumference of neck, 28 cm. The skin is loose and flabby, elastic and soft, very abundant. She is a deaf-mute, but appears quite intelligent. There is no curvature. The thorax is 57.3 cm.; abdomen, 68.6 cm. The limbs seem a little enlarged about the epiphyses. There is no goitre, and there is no trace to be felt of the thyroid gland.

CASE VII. (Syracuse State Institution for Feeble-minded Children: Dr. Carson.)—Martha L. Y., aged sixteen years; parents Americans, not related. Height, 103 cm.; circumference of head, 54.7 cm.; measurement from occiput to root of nose, 32.5 cm.; across head from external meatus to external meatus, 34.4 cm.; circumference of neck, 34.4 cm. The subcutaneous tissues appear infiltrated and myxœdematous, and there are tumor masses behind the sterno-mastoid muscle. The thyroid gland is apparently absent. The circumference of the thorax is 67.5 cm.; of the abdomen, 71.2 cm. The bones of the limbs are a little enlarged at the epiphyses. The teeth are defective. She is feeble-minded, but appears to understand what is said; can only say a few words; answers "yes" and "no." Is cleanly in habits; knows the names of objects, and can match colors.

Dr. Carson writes: "The child presents almost the characteristic features described in cretins by Dr. Down, namely: absence of the thyroid gland, puffy swellings in the supra-clavicular space; skin of an earthy color, loose, and flabby, as if too large for its body; the nose flattened; the distance between the eyes exaggerated; tongue large; lips thick; cranium brachycephalic. She speaks only a few words in monosyllables, and, though occasionally stubborn, is usually of a placid disposition, laughs easily and heartily; is orderly and cleanly in her habits.

CASE VIII. (State Insane Asylum, Stockton, Cal.: Dr. Hoisholt.)—Willie V., aged forty-two years; father was Irish, mother German; no note as to the presence of goitre. Height, 135 cm.; circumference of head, 55.3 cm.; from occiput to root of nose, 35 cm.; from external meatus to external meatus, 33 cm.; circumference of neck, 38.4 cm. The skin is very loose, and in places hangs in large folds. The head is brachycephalic. The skin of the face in smiling is wrinkled. He is imbecile. The thyroid is not enlarged. There are no definite tumor masses above the clavicle; the spine is not curved. He is said to have been much brighter some years ago. The last three years he has had occasional epileptic fits.

CASE IX.—Johnny V., brother of the preceding case, aged forty years. Height, 127 cm.; circumference of head, 58.5 cm.; from occiput to roof of nose over the head, 29.5 cm.; from external meatus to external meatus, 38.3 cm. The skin is extremely loose; hangs in folds. On the scalp one may make a fold of four inches of superfluous skin; same on the neck, face, and back. The intelligence is very defective; speech scarcely intelligible; he is not at all bright, except that he has, under the circumstances, a remarkable memory for names, remembering those of from thirty to forty patients in the ward. The thyroid gland is not enlarged.

The photographs of these two patients show marked brachycephalic heads,

wide nostrils, the eyes wide apart, and the condition of the skin described by Dr. Hoisholt appears to be fairly characteristic.

CASE X. (Randall's Island Hospital, New York: Dr. Furness.)—Nellie R., aged fifteen years, born in New York State. Height, 76.3 cm.; circumference of head, 48.4 cm.; from occiput to root of nose, 30.5 cm.; from external meatus to external meatus, 31.2 cm. The skin is coarse and thick, and there are tumor masses above the clavicles. The thyroid is not enlarged. Circumference of the thorax, 54.7 cm.; of abdomen, 51 cm.; it is distinctly pendulous. She can only stand with assistance. The epiphyses of the limbs seem somewhat enlarged. Intelligence is extremely slight, and she never talks, but can call the name of the nurse. She is affectionate in disposition, and on recognizing the Doctor utters a peculiar shrill cry.

The Doctor writes that the child looks about the age of three years; is unable to walk or to stand erect without support. The photograph illustrates a typical cretin.

CASE XI. (Inmate of the California Home for Feeble-minded Children; Dr. A. E. Osborne.)—I. N., female, aged probably thirty-five years; nationality unknown, supposed to be Irish; no data about the parents. Height, 108 cm.; circumference of the head, 56 cm.; measurement from occiput to root of nose, 35 cm.; circumference of neck, 38.3 cm.; circumference of thorax, 81.3 cm.; of abdomen, 84 cm. The face is broad and flattened; the skin rough, and hangs in folds over the body; the complexion is sallow; the hair very scanty and coarse; the teeth are defective, only half a dozen in the upper and lower jaws; no thyroid gland is palpable; the spine is slightly curved. The intelligence is of a low order, but her memory is good. The disposition is docile. She is tractable and affectionate, and forms strong attachments. She is quick to appreciate a favor, and has a fair sense of humor. The speech is slow and measured; the voice rather low and rasping. Respiration is slow, and the body temperature is below normal.

OPERATIVE MYXCEDEMA.

In connection with the subject of myxœdema, I am indebted to Dr. McGraw, of Detroit, for photographs illustrating the following case, which, so far as I know, is as yet happily unique in American surgery—namely, one of operative myxœdema:

CASE XII.—The patient, George M., is now about thirty years old, and was operated on March 7, 1881. Complete extirpation of the thyroid. The photograph [exhibited] was taken March 30, 1893. A full description of the case will be published by Dr. McGraw. Suffice it to say here that there has been a gradual but progressive change in this young man since the date of the operation. The hair is scanty and coarse; the skin thick and rough; the subcutaneous tissues very thick; the integument and underlying tissues make great ridges on the back and on the hands and feet. The intelligence is good, but the action of the intellect is slow, and he is unable to do any continuous work or to study. He complains of fulness in the head and ringing in the ears when he stoops. Even in standing he is not steady on his feet, and has a tendency to fall. Temperature is normal; pulse, 70; respirations, 20. Heart's action is normal. Voice is harsh and squeaky.

DIPHTHERIA AND OTHER MEMBRANOUS AFFECTIONS OF THE THROAT.¹

BY FRANCIS H. WILLIAMS, M.D.,
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IN discussing this subject there are three principal points to which I shall have the pleasure of calling attention. First, the diagnosis of diphtheria by means of the microscope. Second, the coincidence of diphtheria and other diseases. Third, the treatment of diphtheria.

The Report of the State Board of Health for 1891 gives valuable tables prepared with great care by Dr. S. W. Abbott, which show the mortality of various diseases in Massachusetts, from 1871 to 1890 inclusive. From them it may be seen that during these twenty years there were 56,474 deaths from pneumonia; 36,553 deaths from diphtheria and croup; 19,421 deaths from typhoid fever; and 14,639 deaths from scarlet fever. I shall show later, that even this large figure of 36,553 deaths from diphtheria and croup probably does not represent all the fatal cases of membranous throats during the twenty years. Osler states that while other contagious diseases have diminished within the past decade, diphtheria, particularly in cities, has increased. Moreover, the mortality in this disease is very high, from 40 per cent. to 60 per cent. of the patients dying.

Precise discrimination between different kinds of membranous throats was formerly impossible, but within the last ten years, beginning with the careful observations of Klebs and Loeffler, it has been shown that among membranous affections of the throat there is one of supreme importance which is characterized by the presence of an organism known as the Klebs-Loeffler bacillus. There are often other organisms present with this bacillus, but they are not of such serious import. These other organisms, chiefly various forms of cocci, may also be found in the throat without the bacillus, but associated with such appearances that they often cannot be distinguished from those accompanying the bacillus, except by the aid of the microscope. It has been agreed to call the most fatal of these membranous inflammations of the throat, the disease identified by the Klebs-Loeffler bacillus, diphtheria; certain other forms of membranous throats are often designated as pseudo-diphtheria. Let me recall to your minds some of the characteristics of this bacillus disease, diphtheria. In the beginning it is local; the bacilli grow on or in a mucous membrane or wound, at which point a false membrane is formed; they do not as a rule enter the system—although

¹ Read at the annual meeting of the Massachusetts Medical Society, June 14, 1893.

Frosch¹ has found them in various organs of the body in ten out of fifteen autopsies after diphtheria—but their baneful effects are exerted chiefly through a very poisonous substance, diphtherotoxin, which they secrete and which is soluble and readily absorbed. This substance, which is a toxalbumin, has been isolated, and when freed from all bacilli and injected into animals, causes many of the symptoms of diphtheria, such as paralysis, heart failure and local necrosis, but it does not give rise to a false membrane.

The early recognition of a disease so dangerous to the individual and to those near him as diphtheria is of the first importance, and yet by the ordinary methods an early diagnosis is nearly always impossible. It may even in the very early stage be confounded with follicular tonsillitis. Fortunately, we have now in our hands a means of diagnosis which is excellent precisely in the early stage of the disease. It consists in the examination of cultures made from the suspicious throat, and subsequent inoculation of animals; this requires special training and appliances, and it is necessary to wait about twenty hours to learn the result of the cultures, and longer to learn that of the inoculations.

The Boston City Hospital is now erecting much larger buildings for contagious diseases; at present there are two buildings, each containing two wards besides separate rooms devoted to the contagious service, one for diphtheria and the other for scarlet fever. In the diphtheria wards patients when needing tracheotomy or intubation go to the surgical service, the others to the medical service. Beginning with 1891 I have had during medical services in these wards 442 patients; 211 of these had membranous inflammation of the throat; 231 scarlet fever, complicated in 58 cases with severe membranous inflammation of the throat, making in all 269 patients with membranous throats. The diagnosis by cultures, which I initiated at the hospital, was made in 93 of the cases of membranous throats that were under my care during about three months of 1892 and 1893. In 3 of the cases cover-glass preparations only were made. These 96 cases are classed as follows:

TABLE I.

	Cases.	Recovered.	Died.
Diphtheria	40	20	20
Diphtheria and scarlet fever	12	6	6
Diphtheria and measles	1	1	—
Diphtheria and typhoid fever	1	1	—
Pseudo-diphtheria	19	17	2
Pseudo-diphtheria and scarlet fever	23	18	5
	<hr/> 96		

These examinations showed that a considerable number of the cases with false membranes that were admitted to the diphtheria ward were

¹ Zeitschrift für Hygiene und Infectiouskrankheiten, 1893, Bd. xiii. Heft 1.

not diphtheria, thus demonstrating the necessity for bacteriological examinations. Furthermore, in four of those that were diphtheria there was no membrane in sight. This likewise shows the importance of bacteriological examination where there is the least suspicion of diphtheria.

My plan was to have a sterilized cotton swab rubbed over the throats of all patients coming to the medical side of the diphtheria ward, except those too weak to be disturbed, and over the throats of all those in the scarlet fever ward who might at any time have a deposit in the throat, and cultures were then made, except in a few instances, where cover-glass preparations only were made.

Let me now direct attention to these 96 cases in which the diagnosis was made by means of the microscope, which consist of two series: the first series of 23 cases in 1892, from which the cultures, followed in some cases by inoculation of guinea-pigs, were made for me by Mr. A. P. Mathews, assistant in biology at the Massachusetts Institute of Technology, to whom I am much indebted, and a second series of 73 cases in 1893, for which I enlisted the interest and co-operation of Professor Councilman, under whose direction the cultures were made, and of Dr. E. M. Holden, who gave freely the large amount of time which work of this character requires and on which its success so much depends.

In 49 (Table II.) of the 93 cases I made a preliminary cover-glass examination, when I first saw the patient, from the material adhering to a sterilized cotton swab directly after it had been rubbed over the suspected throat—this examination can be made in a few minutes in the ward or at the patient's house—and on the following day learned the result of the examination made from cultures. If either examination shows the characteristic bacilli every precaution should be taken.

TABLE II.—*Diagnosis of Diphtheria based on Cultures.*

(Both cultures and cover-glass examinations made.)

Diphtheria	20
Diphtheria and scarlet fever	3
Pseudo-diphtheria	8
Pseudo-diphtheria and scarlet fever	10
Tonsillitis	6
	<hr/>
	47

In 38 of these 47 cases (cases 48 and 49 will be referred to later) the cultures and cover-glass examinations agreed, in 7 disagreed, and in 2 cases the result of the cover-glass examination was doubtful. Two of the 7 cases where the two methods disagreed are classed in the table as pseudo-diphtheria, the bacillus not being found in the cultures, although thought to be present in the cover-glass examinations. These two patients died. The third case is classed in the table as pseudo-

diphtheria and scarlet fever, as the bacilli were not found in the cultures, although thought to be present in the cover-glass examination. The brother of the patient had diphtheria and scarlet fever. In the fourth case, where the two methods disagreed, I probably mistook some other organism for the bacillus on the fourteenth day of the disease. In the three remaining cases I failed to find the bacilli in the cover-glass examination, but they were found in the cultures. In the forty-eighth case, not noted in Table II., the bacilli were found neither in the culture nor in the cover-glass examination, but the patient did not enter the hospital until the thirty-fifth day of the disease; she had post-diphtheritic paralysis on the thirty-third day of the disease.

The preliminary examination is of service when the cover-glass shows abundant and characteristic bacilli; it seems to be more satisfactory in the early than in the later stages of the disease. In the later stages the bacillus is more apt to be obscured by slower-growing organisms; failure to find the bacilli does not establish their absence, and the cover-glass examinations should of course be followed by cultures.

The cultures are not infallible; for some reason, such as the presence of a small quantity of corrosive sublimate, the bacilli may not grow when planted, and therefore may not be found in the cultures. With all the sources of error, however, we now have at our disposal a method of diagnosis far better than anything we have had heretofore, which enables us to recognize early the most dangerous among the acute diseases of the throat which are characterized by a membrane. It is a great relief to the family and friends, as well as to the physician, to have such assurance as this means of diagnosis gives us, that certain apparently most serious cases are not cases of diphtheria. It likewise points out to us mild cases of diphtheria that clinically might be classed as pseudo-diphtheria, but the contagion from which might give rise to a serious illness in another individual. By its aid also we may learn in the future to recognize better the symptoms that distinguish diphtheria from other membranous affections of the throat. Further, it shortens the stay of the patient in the hospital and diminishes the period of convalescence for those who have had only pseudo-diphtheria, as unless we can distinguish between them we are compelled to be over-careful of cases in which the after-effects are not so much to be dreaded. As a rule patients in whose throats the bacillus is not found may get up and go about early, while in the cases of diphtheria one should make haste slowly, as even lifting a child out of its crib to feed it may bring on heart failure some time after the acute symptoms have disappeared. Likewise it may sometimes be of great importance to summon the family or friends from a distance if we are assured early that the disease is a very dangerous one.

Diphtheria usually begins on the tonsils, so far as my experience

goes. It is sometimes stated that when the false membrane is limited to the tonsils the disease is not diphtheria, but that if the membrane covers also other parts of the throat the disease probably is diphtheria. Let us consider for a moment what bearing, if any, the distribution of the false membrane has upon the diagnosis. In the 23 cases of scarlet fever complicated with pseudo-diphtheria (Table III.), the membrane was limited to the tonsils in 5 only, and in 3 it had evidently extended to the larynx. In 2 cases of pseudo-diphtheria (Table I.) the membrane had also extended to the larynx.¹ These 5 laryngeal cases were children, the eldest of whom was five years old. In 4 of the 40 diphtheria cases (Table I.) there was no membrane in sight; in 5 the membrane when first seen was on the tonsils only, but it spread later to other parts. In one-half of the pseudo-diphtheria cases (Table I.) the membrane was on the tonsils and other parts. These facts show that in making a diagnosis it is not advisable to place reliance upon the distribution of the membrane, although it seems usually to be more widely distributed in diphtheria than in pseudo-diphtheria.

Extreme youth, the presence of membrane in the larynx or even lower, and a weak heart all influence the prognosis most unfavorably.

We now come to the *second* point, the coincidence of diphtheria and other diseases. Let us consider first the coincidence of diphtheria and scarlet fever, the occurrence of which has been questioned and much discussed. In the series of cases of both 1892 and 1893, already alluded to, such association occurred. In 97 of the cases of scarlet fever the diagnosis was made by cultures in all those that had membranous throats. The result was as follows:

TABLE III.

	Cases.	Died.
Scarlet fever	62	8
Scarlet fever and pseudo-diphtheria	23	5
Scarlet fever and diphtheria	12	6
	<hr/> 97	

In one of the 12 cases of diphtheria complicated with scarlet fever diphtheria was followed by scarlet fever, in one preceded by scarlet fever, and in ten cases diphtheria and scarlet fever occurred simultaneously. This class of cases seems to be rapidly increasing in Boston.

A noteworthy point in this table is the fact that there were more deaths among the 35 cases of scarlet fever complicated with membranous throats than in the 62 cases of scarlet fever only: as we should expect, in scarlet fever complicated with diphtheria, it is the Klebs-Loeffler bacillus which is the dangerous factor and which threatens the life of the patient much more than the scarlet fever. In the light of this ex-

¹ Intubation or tracheotomy may be required in pseudo-diphtheria.

perience, a former series of my scarlet-fever cases is interesting. There were 86 in this series, 19 of which were complicated with membranous throats, and 67 were uncomplicated. Of the 67 cases of scarlet fever, 3 died, or $4\frac{1}{2}$ per cent.; of the 19 cases of scarlet fever complicated with membranous throats, 9 died, or 47 per cent., showing in this series also the high mortality of scarlet fever when complicated with membranous throats as compared with scarlet fever only. These cases came under my charge before a diagnosis by cultures was made in this community.

The source of some of the cases noted in Tables I. and III. deserves a word in passing: 35 of them came from two Homes for Children. The first home sent 19 patients to the hospital between February 14th and March 20th, inclusive. The epidemic began with scarlet fever, of which there were 13 cases, and continued with cases of scarlet fever complicated with pseudo-diphtheria, and scarlet fever complicated with diphtheria, and ended with one case of diphtheria alone; this patient was an adult. The second Home for Children sent 16 cases to the hospital, which included the same variety of diseases as the first.

The coincidence of this bacillus with other diseases than scarlet fever is also interesting. In three of the cases diphtheria and measles probably occurred together. Two of these died. The third and only one in which a swab was taken from the throat (Case 49, already alluded to), has a special interest in that the bacilli were detected readily on a cover-glass by both Dr. Councilman and myself, but they failed for some unknown reason to grow in the culture media, although two trials were made. There was abundant opportunity in this case to get some of the membrane, as the child coughed up large pieces of it.

Another case of interest is one in which diphtheria and typhoid fever occurred simultaneously:

L. J., a girl aged seventeen years, well developed and nourished, was ill with cellulitis of the leg, with possible caries of the femur, for some weeks before she came into my service. Five days before entrance she complained of sore-throat, and two days later a membrane was seen in the throat, in which Dr. Councilman found the Klebs-Loeffler bacillus. The membrane was seen for the last time on the eighth day after entrance. On the day of entrance the temperature was 104° to 105° , and the pulse 130 to 140, but on the following day the temperature reached 105° and the pulse 150; one rose spot was found on the abdomen; the number of spots increased daily for seven days, and were unusually numerous and characteristic. The spleen was enlarged, and its lower edge could be felt at the margin of the ribs. Hæmoglobin was 90 per cent., and the number of leucocytes normal, 7500. On the third day the stools were typhoidal and the patient dull. The pulse was 110 to 120, the temperature remained about 104° for a week, and then fell by lysis to normal. Recovery.

These cases suggest a connection between the bacillus of diphtheria and certain of the paralyses which sometimes occur after scarlet fever, measles, and typhoid fever. Furthermore, the mortality from diphtheria in our State should include some of the cases classed under scarlet fever, measles, and typhoid fever, as already suggested.

We now come to the *third* point, namely, the *treatment* of diphtheria, and this subject divides itself naturally into two parts, general and local treatment. The former may be outlined in a few words. The food of the patient deserves special attention. Alcohol is, in some cases, of service. Iron is frequently given for anæmia.

In 19 cases—

Diphtheria	9
Diphtheria and scarlet fever	3
Pseudo-diphtheria	4
Pseudo-diphtheria and scarlet fever	3
	<hr/>
	19

—most of which appeared anæmic, I determined the hæmoglobin by Fleischl's hæmometer, and this instrument did not in the majority of cases confirm the apparent anæmia. Sixteen of these 19 cases, children and adults, had about, and in some cases more than, 100 per cent. of hæmoglobin. The 3 remaining cases were all children. In the first of these, a child five years old, ill with diphtheria, the hæmoglobin was 75 per cent. In the other two, children of a year old, one ill with diphtheria, the other with pseudo-diphtheria, the hæmoglobin was about 50 per cent. Mercury in small doses has been recommended, but it did not seem to me of service in the few cases in which I have used it or seen it used. The cases of Behring treated with the blood-serum of immune animals encourage us to hope that a feasible internal remedy may be found.

At present local remedies are our best means for the treatment of this disease, and obviously they are best adapted to those cases that are seen early, before much of the poison has been absorbed, and further, to cases in which the membrane is accessible.

Given a patient in whose throat is a patch of membrane filled with bacilli that reproduce themselves in a very short period and which generate a soluble and most virulent poison; a membrane that may be thick and tough, and over the surface of which there constantly passes a stream of saliva that will quickly carry away the remedies applied to it; situated in a region to which applications can be made for short intervals only, and even then is not easy of access: what should we do? It is worse than useless to tear off the membrane; this causes bleeding; the membrane rapidly returns, and over a larger area. The bacillus seems, above all things, to delight in the blood-serum, and the

spread of the membrane follows the course of the bleeding as eagerly as a hungry horse will follow oats. Bacteriologists, in searching for a medium in which to tempt the bacillus to grow outside of the body, have found nothing better adapted to the organism than blood-serum.

Chlorate of potash does not seem to me of service and in excessive doses may do serious harm. Nitrate of silver is a caustic that does not penetrate deeply. Chromic acid is one of the most relentless of all caustics. Iodine is irritating when inhaled, as are the vapors from saturated solutions of chlorine. Solutions of carbolic acid are poisonous and inefficient as germicides. I have not succeeded with digestives. *Sesqui-chloride of iron*, often used in the form of a tincture, has been, and with some still is, a favorite application. Knowing that these iron preparations contained free acid, I thought it probable that the acid rather than the iron would prove to be the active agent. To test this, Mr. A. P. Mathews compared for me a solution of chloride of iron with a solution containing no iron, but having the same quantity of acid as in the iron solution. The iron solution was found to be no better as a germicide against the bacillus of diphtheria than the acid water, thus showing the acid to be the essential agent in the iron solution. The *tincture* of the chloride of iron contains 2.5 per cent. to 3.4 per cent. of free hydrochloric acid; the *solution* of chloride of iron contains from 5.4 per cent. to 7.4 per cent. of free hydrochloric acid. These iron solutions are an excessively unpleasant treatment. *Corrosive sublimate* has much reputation as a germicide, but its action seems to be inhibitory rather than germicidal. I insert here three cases of diphtheria, the diagnosis of which was based on cultures, in which corrosive sublimate was used locally, as better treatment was not at the time practicable, and they show how the membrane may persist under its use:

J. B., aged twelve years, entered the hospital on the third day of the disease. Membrane was seen on both tonsils, both sides of pharynx, and a small spot one-eighth of an inch in diameter on posterior pharynx. Klebs-Loeffler bacilli found in culture. The local treatment for thirteen days was corrosive sublimate 1:10,000 in spray every four hours, but in spite of this the membrane continued to cover more area and to become thicker until the eighth day of the disease, when the throat began to clear. Septic odor. On the tenth day, no bacilli were found in culture; their growth was probably inhibited by the presence of corrosive sublimate. On the sixteenth day, the throat was clear. The heart was noticeably weak in its action, and tincture of digitalis was given. After six weeks, the patient left the hospital for the Convalescent Home. There had been nothing seen in the throat for twenty-six days, and she had been about the ward. She passed three weeks in the Convalescent Home, and then on account of hoarseness returned to the hospital. My service was then at an end, but the records, which I have the privilege of inserting here, state that there was "a piece of membrane adherent to one vocal cord. After eleven weeks, the tonsils were large and covered with a whitish film or membrane which could be

wiped off with difficulty; breath foul. Dr. Councilman found Klebs-Loeffler bacilli abundant." The last record of membrane, which was on the tonsils, was almost twelve weeks after the onset of the disease. The patient was discharged on the one hundredth day of the disease.

This case illustrates the futility of the 1 : 10,000 solution of corrosive sublimate in preventing the spread of the membrane, and the persistence of the bacilli in spite of its use. It would be desirable to have bacteriological examinations made of every throat before the patient is allowed to leave the contagious ward, care being taken not to have corrosive sublimate used at the time the swab is rubbed over the throat, as a very small amount of it will inhibit the growth of the bacilli in the culture tubes.¹

In the two following cases the attempt was made to get a cleansing action from a weak (7.5-volume²) solution of hydrogen peroxide to assist the action of the 1 : 10,000 corrosive sublimate.

In the first of these the patient, a woman aged twenty-two years, had paralysis on the fifteenth day of the disease, and the throat was not clear until the seventeenth day of the disease. In the second case, M. McP., a woman aged twenty-eight years, entered the hospital on the third day of the disease. Thick membrane on both sides of the uvula and on the left tonsil. Klebs-Loeffler bacilli found in culture. The local treatment was a spray of 7.5-volume solution of hydrogen peroxide every two hours, followed by a spray of corrosive sublimate 1 : 10,000. On the seventh day of the disease the patient was hoarse and evidently the membrane had spread to the larynx. Prostration. Reduplication of heart sounds. After ten days a spray of corrosive sublimate 1 : 20,000 was used every four hours. Three days later this was omitted, as the patient was salivated. Seventeenth day, paralysis. Thirty-fourth day the throat was clear. The patient was discharged on the forty-first day of the disease.

These cases show that the membrane may not be removed, but may continue to spread under a local treatment of corrosive sublimate 1 : 10,000, as illustrated in J. B., and also when this is used in connec-

¹ Since this paper was read a man has come to the hospital with naso-pharyngeal paralysis. No membrane was seen in the throat by the physicians who examined him, but Klebs-Loeffler bacilli were found in the cultures. The history of the case showed that the attack of diphtheria had begun about eight weeks previously. This case also shows the importance of bacteriological examination before isolation is ended.

² In the United States a 20-volume solution of hydrogen peroxide has been and still is one which will yield 20 times its volume of oxygen, if decomposed by permanganate of potassium; but one-half of this oxygen is contributed by the permanganate, as it is likewise decomposed. The hydrogen peroxide (or dioxide) water, described in the United States Pharmacopœia for 1890, which will be official on January 1, 1894, is a 10-volume solution, and one in which the number of the volumes named denotes the amount of its own available oxygen. This 10-volume solution is therefore equivalent to the 20-volume solution described above. I have adopted in this article the Pharmacopœial manner of indicating the strength of the hydrogen peroxide solutions, and, therefore, the 50-volume solution of my paper of 1892 becomes here a 25-volume solution.

tion with a dilute solution of hydrogen peroxide, as illustrated by the last two cases.

It would take too long even to enumerate the various kinds of local treatment that have been used in diphtheria, but there are certain conditions to be fulfilled that will serve as a guide in our selection.

We need an agent that will kill the bacilli quickly, and will not injure the patient by its harmful or poisonous attributes. The first step in an investigation of this kind is to ascertain what will kill the organism in the laboratory, although it does not follow that the same result will be obtained in the throat. In the experiments made for me in the Biological Laboratory of the Massachusetts Institute of Technology with various germicides on the bacillus of diphtheria, I chose the short period of ten seconds for the limit of time during which they were allowed to exert their action, as the contact of the germicide with the membrane in the throat must necessarily be short.

The results of a few of the experiments were as follows: A saturated solution of carbolic acid did not kill the bacilli in ten seconds. A solution of hydrogen peroxide of between 12 and 25 volumes, containing $\frac{1}{4}$ to $\frac{1}{2}$ per cent. of acid respectively, killed the bacilli in ten seconds, but it took over a 50-volume nearly neutral solution of hydrogen peroxide to do the same work.

The ordinary hydrogen peroxide solutions offered for sale have a strength of 7.5 or 10 volumes or much less—some of these are neutral, others acid.¹ These weak solutions, whether neutral or acid, are not active germicides, judged by their effect upon the bacillus of diphtheria, an organism which is not so difficult to kill as the staphylococcus for instance, but the neutral solutions have far less germicidal power than the acid ones. I pointed out by some observations published last year,² the distinction that should be drawn between the nearly neutral and the acid solutions, but it is evident that this point needs further emphasis, particularly as the solutions of hydrogen peroxide are coming more into use, and neutral ones are made which are excellent for certain purposes, but which being nearly free from acids, have little germicidal value against the bacillus of diphtheria, *except in unusual strength*.

The strong hydrogen peroxide acid solutions, by which I mean strengths of 25 to 50 volumes or more, as already shown, are efficient germicides in the laboratory, and they have besides the special quality of breaking up and disintegrating certain portions of the diphtheritic membrane without injury to the healthy tissues, thus rendering the bacilli more accessible.

¹ It is interesting to note the importance of the mineral acids, especially hydrochloric acid; they are of value in the hydrogen peroxide solutions, and are good germicides when used alone; hydrochloric acid is, as we have seen, the active agent in the iron solutions, and is also a valuable germicide in the gastric juice.

² Boston Medical and Surgical Journal, September 29, 1892.

Having found a substance that has no poisonous properties, namely, a strong solution of hydrogen peroxide, that is shown to be an efficient germicide in the laboratory, let us see what it will do clinically. I was so situated that in most of the cases in which the diagnosis was carefully made by cultures, the strong hydrogen peroxide solutions were not used, and in most of the cases in which the peroxide treatment was used the cultures were not made. I have made some use, chiefly in 1892, of strong peroxide solutions, in seventy-four cases in all; sixteen of these died and fifty-eight recovered; but as, in most of these, the diagnosis was not based on cultures, it is impossible to state exactly how many were diphtheria and how many pseudo-diphtheria. In the sixteen cases that died the patients entered the hospital after they had been ill an average of five days, so far as I could learn. Eight of these died within one to three days after entrance. There was not much opportunity for treatment, and the hydrogen peroxide was omitted when the patients seemed too weak. Two entered the hospital on the last day of my service, and the strong solutions of hydrogen peroxide were employed on that day only. These patients died about two and four weeks later, respectively. In four cases the membrane was in or extended to inaccessible parts of the throat, and in but one of these was there temporary improvement. In the fifteenth case the patient had diphtheria (as shown by subsequent paralysis) and scarlet fever simultaneously. There was local improvement, but the child died about the fifteenth day of the disease. In the sixteenth case scarlet fever developed on the twelfth day of the disease, when the throat was nearly clear. The patient did well until the fifteenth day, then had suppurating glands and died on the nineteenth day of the disease.

In the four following cases, the diagnosis of which was based on cultures, the strong hydrogen peroxide acid solutions were used. The first two are cases of pseudo-diphtheria.

E. F., aged twenty years, entered the hospital on the second day of the disease. Thin, gray membrane on left tonsil and all along the arch of soft palate. Mr. Mathews found streptococci on cover-glass and in culture, but no bacilli. The membrane was cleared off completely with 50-volume solution of hydrogen peroxide applied with a swab, and this was followed by an application of chlorinated soda. Spray of 25-volume hydrogen peroxide solution every four hours. On the fifth day of the disease, but the third after treatment, the throat was clear. Recovery.

C. D., aged twenty-three years, consulted me on account of some slight difficulty, and, as a matter of routine, I looked in her throat, which was then clear. On the following day, I was much surprised to be sent for in some haste, and then found on both anterior pillars, tonsils and uvula, patches of membrane, which were one-sixteenth of an inch thick and could be removed with some difficulty with the edge of a teaspoon, but this caused bleeding. I removed most of the membrane with

a 25-volume hydrogen peroxide solution, but left the base of one patch on the soft palate, about one-fourth of an inch in diameter, fearing that further attempts to remove it might set up bleeding, as here the mucous membrane looked as if the surface had been etched off. As this patch was at a point readily accessible to a gargle, I left the patient at 1 P.M. with directions to use a dilute acid solution of hydrogen peroxide every half-hour and to follow this by a gargle of diluted solution of chlorinated soda. At my second visit, three and one-half hours later, I was much gratified to find the throat entirely clear of membrane. I saw the patient daily for some days, during which mild antiseptic sprays and gargles were used, but there was no return of the membrane. This was seen only at my first visit. No Klebs-Loeffler bacilli were found in cover-glass examination. Cultures showed streptococci and staphylococci.

We may look for better results in private practice than at the hospital, as in the former case patients are generally seen earlier.

In the two following cases of diphtheria, the diagnosis of which was based on cultures, there was partial use only of strong solutions of hydrogen peroxide, but even by this, good results were accomplished.

A. B., aged twenty-four years, entered the hospital on the second day of the disease. 4 P.M., membrane on right tonsil, thick in places, cartilaginous in character. Membrane also on left tonsil and left wall of pharynx. Klebs-Loeffler bacilli found on cover-glass and in culture. Strong hydrogen peroxide acid 25-volume solution was applied in spray, and 50-volume by syringe and swab, and the membrane removed except in points around anterior edge of left tonsil which were cartilaginous in character. The patient said there was less pain in swallowing a few minutes after the application of the peroxide than before, and after this application he ate his evening meal of eggs on toast, etc. At 9 P.M. the membrane had returned to some extent over its area of 4 P.M., but was not so thick and had not spread. Strong hydrogen peroxide was again applied. Spray of corrosive sublimate 1:10,000 given every two hours through the night. Large dose of bromide at night to prevent serious loss of sleep from frequent waking. The patient slept ten hours. No hydrogen peroxide solution was applied during the night, and the next morning the membrane was found to have spread rapidly over both sides and on to the back of pharynx in spite of the 1:10,000 corrosive sublimate that had been applied every two hours. There seemed to be some membrane in naso-pharynx. Strong hydrogen peroxide acid solution 25 and 50 volumes was then applied to the throat on swab. A solution of chlorinated soda, 1:6, was applied every two hours in spray. At 8 P.M., large dose of bromide. On fourth day of disease, membrane over same area as on the third day; 25- and 50-volume hydrogen peroxide applied morning and afternoon, followed by chlorinated soda. The membrane seemed to be kept from spreading or becoming thick if the applications of hydrogen peroxide were made every four hours, but otherwise it gained in thickness and somewhat in extent. Fifth day of the disease, general condition excellent. Membrane much less in extent and thinner. Hydrogen peroxide only twice during the day. Membrane seemed under control. Sixth day; the patient had eaten well before, but now had appetite. General condition excellent. Throat clearing. Two applications of hydrogen

peroxide, although this seemed hardly necessary, but it was done to prevent the possibility of relapse. Two per cent. spray of cocaine applied to throat prevented pain from the application of the peroxide. On the seventh day of the disease, and the fifth after entrance, a final application of peroxide was made. The patient left the contagious ward six days later. There was no cardiac weakness, no depression, and no paralysis.

M. L., aged eighteen years, entered the hospital February 25th, on the second day of the disease. His throat had the appearance of a follicular tonsillitis. On my first visit I found Klebs-Loeffler bacilli, micrococci and streptococci in a cover-glass examination. The next day Dr. Councilman obtained an almost pure culture of Klebs-Loeffler bacilli. At 1 P.M., there were two small patches of membrane on the right tonsil, the one an eighth by a quarter of an inch and the other an eighth of an inch in diameter. These were removed with six minims of a 25-volume hydrogen peroxide solution in syringe, and this was followed by an application of chlorinated soda. At 5 P.M., the throat was again cleared carefully with 25-volume hydrogen peroxide solution by swab and syringe, followed by an application of strong chlorinated soda on swab. At 9.30 P.M., the membrane was not visible except a thin, yellowish, translucent deposit over original area, namely, on right and left tonsil. This was cleared off with the hydrogen peroxide solution, and was followed by chlorinated soda solution. No hydrogen peroxide was used through the night, but a solution of chlorinated soda was applied every two hours. In spite of this, on the following morning the membrane had spread over the larger part of the right tonsil, and there was also a strip of membrane three-fourths by one-eighth of an inch on each side of the pharyngeal wall. This was cleared off again with 25-volume hydrogen peroxide solution on swab at 10.30 A.M. and again at 5.10 P.M. On the fourth day of the disease, only two applications of the peroxide were made, as the membrane was readily controlled, and on the fifth day one final application of the peroxide was made. On the sixth day of the disease, and fourth after entrance, the throat was clear. Patient felt well and asked if he might get up. Discharged after being kept under observation ten days longer. There was no cardiac weakness, no depression, and no paralysis.

In these two cases the strong solution of hydrogen peroxide was used only two or three times in the twenty-four hours, and the membrane returned during the long intervals of several hours when it was not applied, in spite of the use of corrosive sublimate or chlorinated soda every two hours. These cases had only a partial peroxide treatment. In both instances, the condition of the patient was excellent throughout the illness. These two cases suggest that by early local treatment with peroxide we may diminish the generation and absorption of poison from the bacilli.

I have found nothing that will remove the membrane so well as the strong solutions of hydrogen peroxide.

The *drawbacks* of the strong solutions of hydrogen peroxide¹ consist,

¹ I give some details concerning the strong hydrogen peroxide solutions, as they are a novelty. Physicians and chemists told me that even 25-volume solutions were impracticable

first, in the fact that the acid solutions, which are stronger germicides, cause pain, due to the acid, which lasts about one minute. Some patients object to this very much; others, including children, will permit the use of a 50-volume solution with little fuss. In private practice, I recall a young lady who applied the 50-volume solution to her own throat on a swab and used it more frequently than I had directed. On another occasion I suggested in consultation that cocaine be first applied to the throat, but the physician in attendance said it was unnecessary, as the patient, a child three and one-half years old, did not mind the 50-volume solution, which he had been using in spray. The discomfort is due to the acids rather than the hydrogen peroxide; if the solutions are neutralized the discomfort is largely obviated. We may disguise the acid by adding sugar, as in lemonade, showing that it is the acid taste that is disagreeable rather more than the so-called irritation. Instead of adding sugar we may apply cocaine to the throat before we use the hydrogen peroxide solution. The amount of acid in the 25-volume solution which I used was $\frac{1}{2}$ per cent., in the 50-volume 1 per cent. This is far less than the amount of acid in the chloride of iron solutions, for, as already stated, the tincture contains from 2.5 per cent. to 3.4 per cent. of hydrochloric acid, and the solution of the chloride of iron from 5.4 per cent to 7.4 per cent. of hydrochloric acid.

Second. Strong solutions of hydrogen peroxide¹ have not been easily procured, nor do they bear transportation well, but these inconveniences may be readily surmounted. The apothecary or physician has merely to evaporate a 10-volume solution in a shallow, open dish, over a water-bath, or on a range or stove, to obtain a solution of either about 25 or 50 volumes.² The initial solution should not be too acid, the dish should not be of metal and should be free from organic matter.

or impossible, but as the caution came after I had had a 100-volume solution I was not dismayed.

Unlike chlorine and chlorinated soda, corrosive sublimate, if desired, may be mixed with hydrogen peroxide; citric or tartaric acid should be added to prevent the precipitation of albuminate of mercury in the throat.

It gives me pleasure to again express my indebtedness to Professor H. P. Talbot, of the Massachusetts Institute of Technology, for his assistance in the study of hydrogen peroxide.

¹ The stability of the strong solutions and the precautions to be used for keeping them I have already described in a former article. As soon as the properties of strong solutions are more widely known and it is appreciated that they may be obtained without much difficulty, they will, I believe, find other uses than that of a local application in diphtheria. They should not, of course, be employed in closed cavities, as the oxygen liberated might cause pressure.

² To be more precise, a 25 or 50-volume solution may be obtained by evaporating a 10-volume solution to $\frac{1}{5}$ or $\frac{1}{10}$ of its bulk respectively. The loss of the hydrogen peroxide is usually less than 10 per cent. in the former case, and about 20 per cent. in the latter. The temperature being the same, the loss seems to be less when the hydrogen peroxide is evaporated quickly than when the process is carried out more slowly. One teaspoonful of a 50-volume solution is ample with which to begin the treatment. The strong solutions should be kept in a cool place.

By evaporating 200 c.c. of a 11.5-volume solution I have obtained a 275-volume solution. A drop of this applied to my tongue caused momentary smarting.

A 10-volume solution of hydrogen peroxide may be tested in the following way: One drachm

Third. Hydrogen peroxide is a bleaching agent and should not be brought into contact with the hair or with colored fabrics, but it does not injure white cotton or linen. One should avoid getting it on the fingers, as it may, after a few minutes, whiten a thickened epidermis and cause a sensation of pricking.

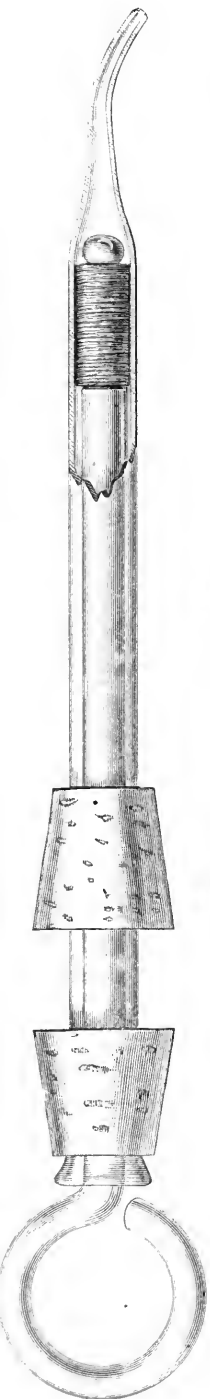
The *advantages* of the strong hydrogen peroxide solutions are that they are good germicides and are not poisonous nor harmful to the mucous membrane; they cleanse a foul throat and break up and disintegrate certain portions of the diphtheritic membrane, thus rendering the bacilli more accessible. They likewise assist in diagnosis, for when the hydrogen peroxide, even in weak solution, is applied to the throat where there is any trace of membrane, it causes it to assume a white color from the presence of fine foam which is made by the liberation of the oxygen gas. It thus becomes a useful agent in detecting spots of membrane earlier than they would be apparent in any other way, and thus indicates the areas to which the treatment should be directed. With this end in view, the throat may be sprayed or the mucous membrane may be swabbed with dilute hydrogen peroxide. It is known that corrosive sublimate to a considerable extent is inhibitory rather than germicidal in its action, but it would be difficult to conceive of a merely inhibitory action on the part of hydrogen peroxide, as this substance is so readily decomposed.

No rule can be given for applying these solutions that will cover all cases. In a general way it may be said that the strong solutions of hydrogen peroxide containing about $\frac{1}{2}$ per cent. of acid, made up chiefly of hydrochloric or sulphuric acid, should be gently but thoroughly applied every four hours during the night and more frequently during the day for the first few days. The 25-volume solution may be used in spray; the 50-volume may be applied, a drop or two at a time, on a swab until the membrane is removed or much diminished, or in certain cases the 50-volume solution may be applied with the syringe. Even a stronger solution than 50 volumes may be used for resistant membranes. It is well to use cocaine before applying the peroxide. By the help of bromide at night, the patient loses very little sleep in being aroused for the local treatment. Every precaution should be taken to spare the patient's strength, and it is not necessary that the head should be raised from the pillow while the applications are being made.

As the bacilli are not limited to the diphtheritic membrane, antiseptics should be brought into contact with other portions of the throat

of it diluted with about an ounce of water and acidified with about three drachms of dilute sulphuric acid will dissolve and decompose three grains of permanganate of potassium (in crystals) and leave a colorless solution. If the strength is less than 10 volumes the solution will finally be of a bright-red color.

FIG. 2.



and nose than those covered with membrane, by such means as sprays and gargles, as a prophylactic measure.

The accompanying cuts show the instruments which I have designed for making applications to the throat; but any good atomizer, not of metal, that will reach the desired spot conveniently, or a swab made by twisting a small piece of absorbent cotton about the end of a small stick, may be used.

FIG. 1.

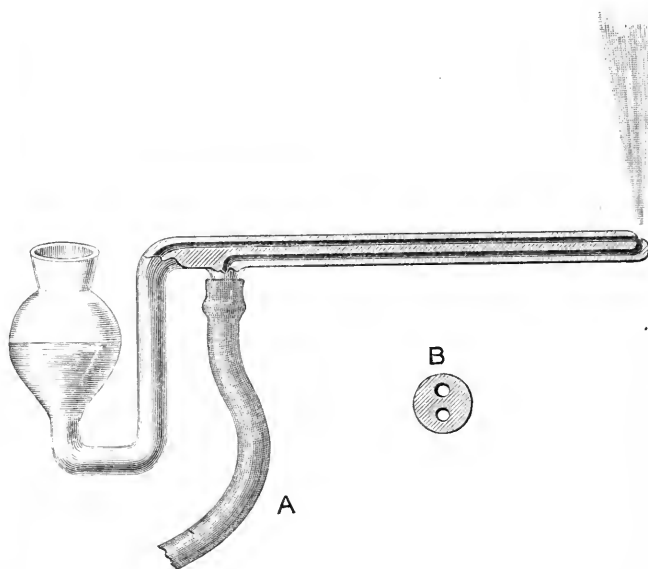


FIG. 3.



FIG. 1.—A, rubber tubing to hand-bulb. The cut is one-half size except the section of the tube at B, which is full size. The bulb in the drawing should have more the shape of a top, and when of such shape it can be placed on its side without losing any of its contents if it is not more than half full. If the tubing, A, which joins the rubber hand-bulb to the atomizer is only about one inch long, the atomizer can be worked with one hand. It will be noticed that the straight tube of the atomizer is unusually long—more than four inches from the rubber tubing to the tip.

FIG. 2.—The syringe is of glass one inch longer than the drawing, otherwise this is the full size. The walls of the syringe beyond the piston are thick, and the tip is smooth, having been rounded in a flame. The form is such that it can reach any part of the throat within sight. The corks are now replaced by glass projections. The packing may be of cotton or asbestos. The cost of the syringe is trifling.

FIG. 3.—The swab is eight inches long, but otherwise the drawing is full size.¹

¹ These are made by P. J. McElroy, East Cambridge, Mass., U. S. A.

By means of this atomizer (Fig. 1) the spray may be sent in three directions, up and right and left, in the throat without taking it out of the mouth, but merely turning it in the hand.

The syringe (Fig. 2) may be pushed through the false membrane and a drop or two of solution pressed out, the oxygen then generated underneath a *thick* membrane will lift off large pieces of it. In this way large numbers of bacilli are removed, the poison from which might otherwise be swallowed and absorbed.

The swab (Fig. 3) used to apply the solution consists of a small glass tube drawn out at one end into a smaller rod, about which sufficient absorbent cotton has been twisted to hold two or three drops of liquid. The end of the rod has been rounded in a flame and made slightly bulbous, as shown by the dotted line; by this device the cotton is held firmly.

The sterilized swab and its holder, seven inches long, which I used for taking specimens from the throat are shown in the woodcut (Fig. 4), which is about one-half size. After the swab has been rubbed over the throat it is replaced in the tube of thick glass, which is stopped with sterilized cotton. A small piece of this having been previously torn off is moistened with a few drops of water and placed above the stopper to prevent the specimen from drying. The tube is then closed with a cork to prevent evaporation. There should be no delay in taking a swab from the throat, and the treatment should then be applied without waiting for the result of the cultures.

I have found it difficult to obtain some common germicides—not only hydrogen peroxide—of the strength which they purport to be. This leads me to emphasize the need of caution concerning the quality of the remedies we employ. Physicians may well take a lesson in therapeutics from the surgeons, for in antiseptic surgery, which is largely therapeutics, they set us an example of painstaking care in the use of remedies that we should do well to follow. If in surgery, where the conditions are comparatively simple, so much pains must be taken, how much more careful should we be when the problem is more complex. When in the selection and application of our remedies we approach the standard antiseptic surgery has set for us, we shall hear less about the inefficacy of drugs.

Diphtheria usually begins on the tonsils, and, to avoid serious consequences—for instance, those resulting from the spread of the membrane to the neighboring air-passages—no moments should be lost before beginning treatment. Until we have found something that will find

FIG. 4.



and kill all the bacilli at a single blow, any local treatment must be frequently applied to be efficient, as the bacilli reproduce themselves in a very short period. From these frequent applications during the early days of the disease I see, at present, no appeal. The use of the strong hydrogen peroxide solutions reduces the number of applications to a minimum, as the more thoroughly the membrane is disintegrated and removed the less frequent is the necessity for treatment and the shorter its duration.

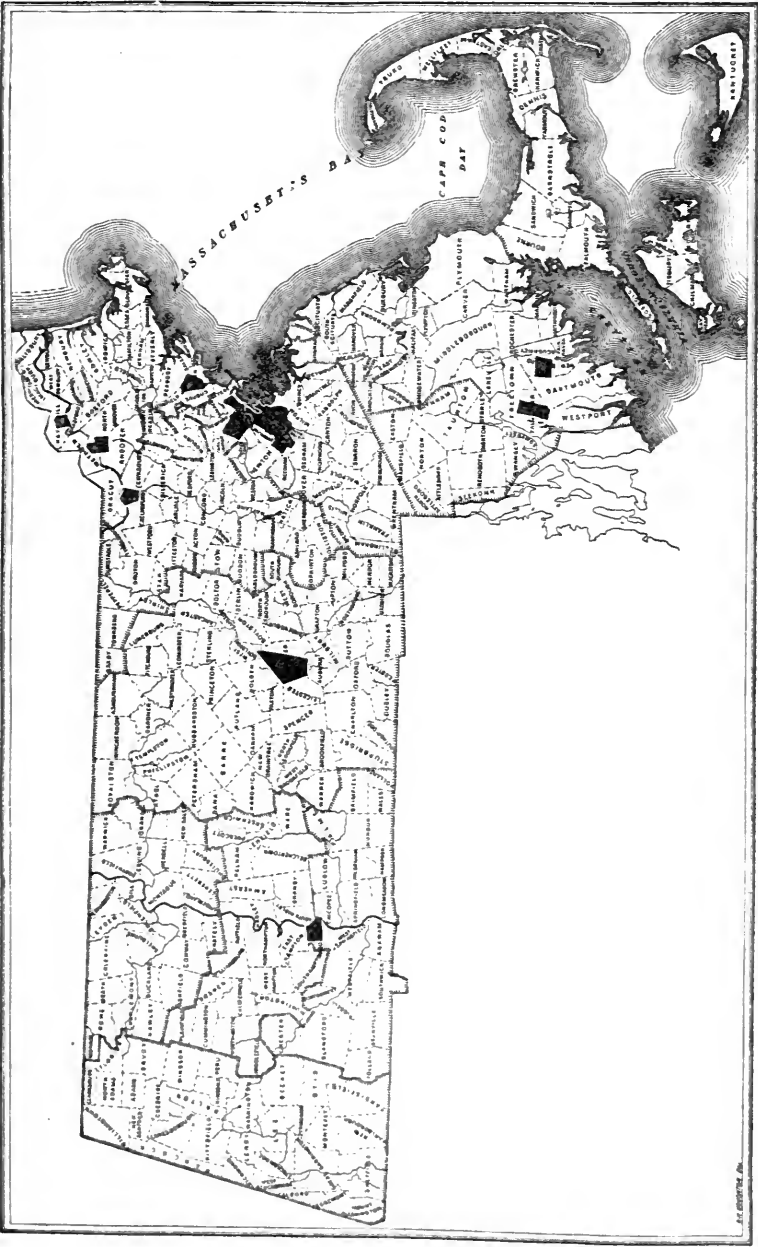
In those cases that are first seen several days after the onset of the disease, and when the patient has become weakened by the poison generated by the bacilli, we must weigh carefully the loss of strength resulting from frequent applications, especially in very young children, against the gain to be derived from the removal or destruction of the bacilli. Further, if the patients have been ill some days when first seen, the chances of recovery are much diminished, and in some cases no treatment as yet at our command is of avail; just when the physician shall renounce all hope of aid from local treatment each one must, of course, decide for himself in the individual case. The usefulness of good local treatment is in direct ratio to the stage of the disease, the accessibility of the membrane, the age and strength of the patient, and the ability of the practitioner to apply it with the least tax on the patient's strength combined with the greatest destruction of the bacilli.

I beg you not to go away from here with the impression that diphtheria can always be cured by strong hydrogen peroxide solutions. I maintain only that when properly used they are more efficient and less harmful than any other treatment I know of. Under their use all of the few cases that I have thus far seen early in the disease, recovered.

As already stated in the opening of this paper, there were 36,553 deaths from diphtheria and croup in Massachusetts from 1871 to 1890, inclusive. Rather more than one-half of these, 19,310, occurred within a very limited area, that is, within the area of the twelve cities, or those fractions of them represented by the nine¹ black spots on the accompanying map. During these twenty years about 43 per cent. of the population was to be found in these cities, and 53 per cent. of the deaths from diphtheria and croup during this time occurred in them. Further, it is of interest to note that the greater part of these deaths occurred during four months of the year, namely, from October to January, inclusive. These are suggestive facts when considered from the standpoint of prevention. It is highly important for each city and large town to have a suitable hospital for contagious diseases, and also to offer facilities for bacteriological examinations in those diseases in which false membranes develop. In smaller communities it would seem desirable to extemporize a hospital during an epidemic.

¹ Four cities—Boston, Cambridge, Chelsea, and Somerville—are contiguous.

Diphtheria seems to me to be chiefly a hand-to-mouth or mouth-to-mouth disease; its cause is tenacious of life, especially in damp places, and is not killed by cold, but is killed by sunlight. The



period of incubation after the bacilli have reached the mucous membrane is probably in some cases not days but hours only. With the improved means of diagnosis at our command, by early isolation, and the co-operation of intelligent citizens with the Boards of Health, it may become one of the most preventable of diseases, and I hope that before many years have elapsed we shall see diphtheria considerably diminished in our State as well as elsewhere. The members of this Society can do much to further this end. The best defence against this disease is educated public opinion.

SUMMARY.

1. The necessity of cultures as a means of early diagnosis.
2. The coincidence of diphtheria and other diseases.
3. The bacteriological examination of all patients ill with scarlet fever, typhoid fever, measles, or other disease, who have membranous throats.
4. The bacteriological examination of specimens from the throats of all diphtheria patients before isolation is ended.
5. Seven and one-half- [known at present in the United States as fifteen-] volume solutions of hydrogen peroxide are weak germicides.
6. The advantages of strong hydrogen peroxide solutions, locally, in diphtheria. The substitution of harmless and more efficient for harmful or inefficient local treatment.
7. The importance of frequent, early local applications.

NOTE.—Dr. John F. Young, of Newburyport, Mass., was present when this paper was read, and ten days later had a case of diphtheria, in which he used the strong hydrogen peroxide solutions. I heard of it by chance some weeks afterwards, as the patient was the child of an acquaintance. In reply to my inquiries, Dr. Young kindly wrote me about the case. With his permission I quote his letter almost in full:

“My patient was a bright and sensible girl aged ten years. On the morning of the 24th of June she complained of headache and sore-throat; I saw her for the first time about four o'clock that afternoon. There was some stiffness of the neck and some swelling on each side at the angle of the jaw. The tonsils and arches of the palate were red and swollen. There was considerable fever and also a good deal of dizziness when the patient sat up in bed. Small dose of calomel, as bowels were somewhat confined, and boric acid gargle.

“Saw her next morning, 25th, about ten o'clock, when tonsils and arches of palate nearly up to uvula were covered with a thick, grayish exudation, the cervical glands were more swollen, and more constitutional disturbance was present than on first visit. Treatment with peroxide of hydrogen was now begun after evaporating the solution to one-quarter its original bulk; and, as the patient complained of no very disagreeable sensation from its use, it was ordered to be applied in the

form of a spray every hour. Saw the patient again about 7 P.M. There had been no extension of exudation, no other change noticed, except that the exudation looked thicker and more swollen. Directed that spray be used every two to three hours through the night.

"On the morning of the 26th, no considerable change in appearance of throat, no extension, but patient had decidedly less trouble (dizziness) on sitting up, and expressed herself as feeling better. Evening about the same.

"27th, A.M. Patches on tonsils and palatine arches appeared to be more loosely attached and also thicker than before. A patch of exudation (rather thin) about the size of a finger-nail, was seen opposite the last inferior molar on right side, and another on the front of soft palate near roof of mouth on left side. The peroxide was now applied by means of a swab and repeated again toward evening by myself, the spray being used as before by the nurse. During the evening on swabbing the exudation in the mouth it seemed to melt away, leaving raw and bleeding surfaces, and the original patches to diminish in size considerably, and on the morning of the 28th it came off almost at the first touch of the swab. The surfaces left bare were raw and bleeding, and a spray of carbolic acid and lime-water was now substituted for the peroxide and used every hour. No reappearance of patches at the evening visit.

"29th, A.M. White patches again covered tonsils and arches of palate, not so thick, however, as before, and were removed entirely by two swabbings with peroxide on same day, and did not again return. Spray of carbolic acid and lime-water was continued for the next two days, when one of boric acid was substituted for it.

"By the 4th of July the throat was looking almost well. At this time a slight nasal intonation was noticed, and after this there was some tendency to regurgitation of liquids through the nose. (This became more marked later.)

"It seemed to me that the peroxide had a decidedly beneficial effect, the constitutional symptoms growing less and less every hour from the very start. The general treatment of the patient consisted in the administration of iron, brandy and milk every three hours, and meat juice midway between feedings of milk and brandy."

The noteworthy points in this case are, first, the effect of the local treatment by strong hydrogen peroxide solutions on the patient's general condition; second, the disappearance of the membrane under the use of this application; its reappearance when carbolic acid and lime-water were substituted, and its final disappearance when the strong hydrogen peroxide was resumed.

I wish to express my appreciation of the courtesy and kindness that have been extended to me in the chemical and biological laboratories of the Massachusetts Institute of Technology, by Professor T. M. Drown and Professor William T. Sedgwick, while I was carrying on some of the investigations connected with this paper.

THE PATHOLOGY AND DIAGNOSIS OF DIPHTHERIA.¹

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As Dr. Williams has fully considered the clinical side, I shall describe the pathological anatomy of diphtheria and other pseudo-membranous inflammations of the throat, and describe the methods used at the Boston City Hospital in distinguishing between the various diseases in which pseudo-membranous inflammations of the throat appear.

The first description of diphtheria was given by Bretaneau. He described as the special anatomical feature of the disease a pseudo-membrane in the pharynx, which often extended to the air-passages. Trousseau found this description too narrow, and regarded the localization of the disease as of secondary importance. He was the first to recognize its infectious nature, and says that the disease is produced by a specific, definite virus, and death is the result of the poisoning of the system with this virus. Whatever are the local manifestations of the disease, whatever its general form, according to Trousseau, diphtheria is always a definite infectious disease, and one case always arises from a similar case. At the time when Trousseau wrote, in 1860, the disease was less prevalent than at a later period, and appeared in the form of circumscribed epidemics, and sometimes as definite house epidemics. Under these circumstances he was able to trace the infection very easily, and infectiousness appeared to him as the chief and most striking feature of the disease. It afterward became much more difficult to trace the infection in many cases, because since 1860 the disease has gradually become a pandemic, extending over all Europe and America.

With the importance attached to the disease from its gradual and great increase its clinical features received more attention. The pseudo-membrane, which was described by Bretaneau, became regarded as its characteristic feature. In consequence of this all manner of inflammations of the pharynx in which a pseudo-membrane was present were regarded as diphtheritic. It was not long, however, before the pendulum began to swing in the other direction. The histology and the histogenesis of the pathological process connected with the formation of the membrane were closely investigated, and it was found that a fibrinous exudation taking the form of a membrane which could not be distinguished anatomically from true diphtheria, might be produced in a number of ways. It might, for instance, follow wounds and traumas of the pharynx, and in the air-passages it could easily be produced by various irritants, as by the inhalation of the vapor of ammonia. I once saw

¹ Read at the annual meeting of the Massachusetts Medical Society, June, 1893.

the most intense inflammation of the larynx, trachea, and air-passages, with the production of a false membrane extending into the small bronchi, which followed the accidental inhalation of croton oil, which had been placed on the back of the tongue. The patient had been brought into the hospital unconscious in a stage of uræmic coma. A few drops of croton oil were placed on the back of the tongue, and the patient at that moment made an inhalation, and a portion of the croton oil entered into the air-passages. We see the same sort of inflammation produced in other mucous membranes by various irritants. It may be produced in the rectum by the application of ammonia, and in the intestinal canal generally, but particularly in the large intestine, it may be produced in various inflammations due to different bacteria. Not only is the pseudo-membrane found in the throat in cases of diphtheria, but also in other infectious diseases, particularly in scarlet fever.

Before the era of bacteriological investigation there was no way of absolutely distinguishing those cases in which the membrane was the result of an inflammation which might be produced by various causes from those in which it represented the local lesion of a specific infectious disease. It can easily be seen that this would result in the greatest clinical confusion. One clinician would report a long series of cases which he regarded as diphtheria, in which an improved method of treatment brought out by himself was successful in all cases; whereas another would report an almost unbroken series of deaths from the disease. Some cases under any form of treatment ran a mild course, whereas other cases would be followed by death. In the same way infection of other individuals would follow in certain cases, and from a single case an extensive epidemic might arise. Other cases in which anatomically the same lesions were found would not be followed by a further infection. Various methods of distinguishing clinically between diphtheria and other infections with similar anatomical lesions were attempted. Some regarded the greater extent of the pseudo-membranous deposit and its extension from the tonsils to the palate and the air-passages as the distinguishing feature of diphtheria. Many regarded only those cases as true diphtheria in which paralysis was observed after recovery.

In diphtheria, as in many other diseases, perfect clearness in diagnosis only arose after the discovery of the etiological factor. We know now that diphtheria is always associated with the presence of micro-organisms characterized by definite morphological and biological characters. The clinician gladly accepted this method of differentiation, because the attempt to define diphtheria according to its clinical features was so completely shattered. We regard now those pseudo-membranous inflammations as belonging to diphtheria in which the Klebs-Loeffler bacillus is found. When that is not present, no matter what the extent and the character of the local lesions, no matter what the severity of

the symptoms, the disease is not diphtheria. The Klebs-Loeffler bacillus is a small organism not much larger than the tubercle bacillus. Its most striking feature morphologically is its variation in form and its irregularity in staining. The ends of the organism are frequently clubbed, sometimes at one and sometimes at both ends, and in most cases when stained it shows a series of clear spaces along with intensely stained particles. The form and size varies greatly under various circumstances. In different cases, it appears in some much larger and more irregular than in others, and in the same preparation great irregularity may be seen. It grows readily on a variety of culture media and most readily on the modified blood serum first introduced by Loeffler. When cultivated on potato it is much larger and more irregular in form than when grown on any other medium. The organism is pathogenic for a number of animals, especially for young cats and guinea-pigs. In guinea-pigs the most virulent form of the organism will produce death in from thirty-six to forty-eight hours. Like some other organisms there is a marked difference in its virulence. While cultures from some cases will always produce death in thirty-six hours, in others death will not take place for several days; in others again the animal may survive the primary inoculation and afterward die of paralysis after an interval of three or four weeks. In still other cases no results may follow inoculation.

The histology and the histogenesis of the diphtheritic membrane has been closely studied by Weigert and other investigators. The diphtheritic membrane is due to a combination of necrosis and inflammation. The essential factor which determines the production of the membrane is necrosis of the surface epithelium. The necrotic tissue supplies the fibrin ferment and fibrin is formed from the serous exudation which comes in contact with the necrotic tissue: in whatever way necrotic tissue may be produced on a mucous surface we shall have a certain amount of fibrinous exudation in and upon this. The inflammation characterized by the presence of a membrane on the inflamed surface is known as *diphtheritic inflammation*, however it may be produced; it does not necessarily have any connection with the infectious disease *diphtheria*. We see the same thing in other pathological processes. We may have suppuration produced by a large number of bacteria. While each form of suppuration has more or less distinct characters given it by the micro-organisms causing it, we cannot easily distinguish between the various forms. We may also have fibrinous pneumonia produced in a number of ways, and we cannot always distinguish anatomically the fibrinous pneumonia produced by the pneumococcus from that produced by the streptococcus and other organisms. If we regarded the suppuration produced by one organism, as the staphylococcus aureus, as a definite, infectious disease, we can see in what confusion we should be thrown in attempting to separate this by its anatomical features from other sup-

purations. The *diphtheritic inflammation* is essentially an anatomical process. The name is one well chosen, because it simply refers to the presence of a membrane which is the common feature. It is, perhaps, unfortunate that the name diphtheria is given to the infectious diseases we are considering, because the name tends to confuse the disease with other pathological processes in which there is also inflammation with the production of a membrane.

In diphtheria the formation of the membrane usually begins in the tonsils, and in most cases the primary infection seems to take place here. Not only do the various crypts and depressions in the tonsils form a suitable place for the lodgment of the bacilli, and their growth, but the protecting mucous membrane is thinner on the tonsil than elsewhere. In some places on the surface of the tonsil the sub-epithelial tissue may be exposed. There is very frequently a mild degree of inflammation of the tonsils, which may lower the resistance of the tissues to infectious organisms. From the tonsils the membrane may extend over the pharynx, the palate, the base of the tongue, and into the air-passages. In the air-passages it may extend from the larynx into the trachea, and even into the ramifications of the bronchi. Sometimes the membrane extends in an almost continuous layer over all these parts. Sometimes only small isolated patches are found. In general, when the large continuous membrane is formed, it is due to confluence of smaller patches. The membrane may be confined to the tonsils, and even to one tonsil, but it generally extends over both. The membrane presents a dirty gray, and in some cases a brownish color, which may vary greatly in its thickness, and may be more or less adherent. After death its connection with the tissue beneath is less firm than in life, and it may be stripped off in large shreds. The adhesion of the membrane to the tissue beneath varies in different places. In the air-passages it is less adherent than in the pharynx, and not infrequently even during life large masses of the membrane may be separated and coughed up. The reason for this difference is found in the anatomical character of the mucous membrane in the two places. In the air-passages beneath the epithelium there is a dense basal membrane which forms a limit to the pseudo-membrane. In the pharynx this basal membrane is not present, or certainly not to the same degree. In the pharynx the tissue beneath the epithelium is involved, and there is frequently a direct connection between the fibrin composing the membrane and the patches of fibrin in the tissue beneath. The membrane also extends down into the crypts of the tissue and into the mucous glands, and in this way it is made more adherent. The epiglottis also shows a varying degree of involvement in the process. There may be only small foci scattered over the surface of this, or the entire epiglottis may be converted into a dense, hard, necrotic mass filled with fibrin. The diphtheritic membrane is

not on the surface of the mucous membrane, but the mucous membrane itself forms a part of it. After removal of the membrane ulcers varying in extent and depth are produced. Vessels are ruptured and small hemorrhages are produced in the tissue beneath. The ulcers vary in depth; sometimes they are superficial, at others they extend for some distance into the tissue. The mucous membrane adjoining the diphtheritic membrane is intensely injected, and there is swelling and œdema of all the affected parts.

On microscopic examination of the membrane itself it is found to be composed almost entirely of fibrin and of necrotic tissue which has undergone fibrinoid metamorphosis. We find in the membrane both small masses of fibrin, which may be recognized as such, and large irregular refractive masses forming a network which has all the essential characteristics of fibrin, as shown by staining. These large hyaline masses are produced by a direct metamorphosis into fibrin of the necrotic epithelium and of the pus cells in the inflammatory exudation. Within the membrane we rarely find any well-preserved cellular elements. In some cases, however, it may contain a considerable number of pus cells. In the tissue beneath the membrane we find evidence of the most intense inflammation. The tissue is swollen, œdematous, and infiltrated with an inflammatory exudation. The bloodvessels are dilated and contain numerous pus cells. The pus cells are also found throughout the tissue, both diffusely scattered and in groups. The necrosis is not directly confined to the surface, but from the surface it extends irregularly into the tissue beneath. The necrosis here is also accompanied with a formation of fibrin, and the fibrin of the membrane frequently forms a direct connection with the fibrin in the tissue beneath, which leads to a greater degree of adhesion. When sections pass through the membrane and also involve the adjacent tissue, it will be seen around the edges that the membrane frequently extends over the unchanged epithelial surface.

All of the lymph glands in the vicinity are enormously swollen, and after death in the majority of cases we find a general lymphadenitis. In certain places the lymph glands are more involved than in others. The lymph glands involved to the greatest extent are the cervical and the bronchial lymph glands, the lymph follicles of the intestines and the mesenteric glands. In the intestines there may be such an involvement of the solitary lymph follicles and Peyer's patches that we may have appearances resembling the beginning of typhoid fever. The spleen is unusually swollen, the liver, kidney, and heart show marked granular and sometimes fatty degeneration. In the kidneys there may be a definite acute nephritis, but this is rarer in diphtheria than in scarlet fever and some other infectious diseases. Lesions in the lungs are constantly found. These lesions consist of bronchitis and areas of broncho-

pneumonia, sometimes very extensive, and more common in the lower posterior portions of the lungs.

On microscopic examination of the tissues we find the lesions first clearly described by Oertel. In almost all the tissues, both those in which macroscopic changes were found and those in which no macroscopic lesions were apparent, we find small areas appearing under low powers of the microscope somewhat like tubercles. These small areas consist in circumscribed necrosis of the tissue cells with breaking up of the nuclei and some formation of fibrin. They are more common and more extensive in the lymph glands than elsewhere. These microscopic foci of necrosis with nuclear fragmentation are the most definite anatomical lesions of diphtheria, probably more so than the membrane. While they are undoubtedly present in other infectious diseases, notably in the liver in cases of typhoid fever, in no other disease than diphtheria are they so numerous and so generally distributed in all the organs.

The lesions produced in animals by inoculation are of the same character as those seen in man. When a small amount of a pure culture of the diphtheritic bacillus is placed beneath the skin of the animal, at the seat of inoculation there is a necrotic fibrinous inflammation. If the skin is removed over a part and the wound is inoculated, a fibrinous inflammation on the surface is produced. The lymph glands are swollen and the same necrotic foci are found in all the tissues, which are seen in man. When the inoculation is made on the surface of the conjunctiva or on the pharynx a definite membrane is produced.

In man the action of the diphtheritic bacilli is frequently complicated by the action of other organisms. There are other pathogenic organisms almost constantly present in the mouth, and of these probably the most important are the streptococcus pyogenes and the diplococcus lanceolatus. The staphylococcus aureus was found in our cultures a number of times, but not so frequently by far as the streptococcus. It is uncertain whether the staphylococcus is capable in itself of exciting a fibrinous inflammation with the production of a membrane. In all cases in which a definite membrane was found, either the diphtheria bacilli or the streptococci were found. The fibrinous inflammations due to the streptococci are frequently found accompanying other infectious diseases, or they may be found alone. The streptococcus is certainly an active agent in producing most of the throat affections which are found accompanying scarlet fever and measles, particularly the former, although as we shall see, cases of mixed infection between diphtheria and scarlet fever marked by the presence of diphtheria bacilli are not very uncommon. Although the appearance produced by the two organisms, the diphtheria bacillus and the streptococcus, may be so exactly similar that they cannot be distinguished from one another during the life of the individual, after death, as a rule, we are able to distinguish between them. The

diphtheria bacillus is not a pus-producing organism. It does not have the same power of dissolving the tissue and leading to the formation of an abscess as has the pus organisms. Its action, further, is one almost entirely superficial and does not tend to invade the adjacent tissues. After death in the pseudo-membranous affections of the throat accompanying scarlet fever, the membrane is, as a rule, not so thick and cannot be so readily removed as in cases of diphtheria. It is almost always confined to the pharynx and has no tendency to invade the epiglottis or the air-passages. The redness and œdema of the surrounding parts are more marked than in diphtheria. Not infrequently definite abscesses are found, either in the submucous tissues or in the lymphatic glands. The organisms reach the lymphatic glands along the lymphatics, and frequently white lines of purulent infiltration of the tissue can be traced from the local lesion to an adjoining lymphatic gland in which the abscess is formed. On microscopic investigation the streptococci are found in great abundance in the tissue. Usually their presence is not complicated with that of other organisms. In other cases, staphylococci may be found with them. When the staphylococci are present abscess formation is usually more common than when the streptococci alone are present. In cases of death from scarlet fever, if the throat lesions are extensive there is nearly always a general infection of all of the organs of the body with streptococci. They are found in pure cultures in the heart, kidneys, spleen, liver, and lymphatic glands. There is good reason to believe that this secondary infection with streptococci is the cause of the nephritis which so often accompanies scarlet fever. In two autopsies on scarlet fever made at the City Hospital, in which there were very extensive throat lesions and general infection with streptococcus, acute nephritis was found. In another case in which no throat lesions were found, there was no nephritis and no general infection with streptococci. The streptococcus is so commonly found associated with scarlet fever that many have thought of the possibility of this organism being the cause of the disease. We think it more probable that it represents simply an accidental infection, the accompanying inflammation of the throat affording it suitable opportunity for development.

After death from diphtheria, the diphtheria bacillus is not found in the various organs of the body. We have never found it either in cultures made from the organs, or by direct microscopic examination. For a long time it has been held that the action of the diphtheritic bacillus was essentially a local one, confined to the place where the membrane was found. Recently, Frosch has obtained the organism in the various organs of the body, in ten out of fifteen cases of diphtheria. The method which he used was to take large masses of the various organs, and smear them over the surface of the culture tube. In this way he

succeeded in getting the organisms in the liver, spleen, kidneys, and heart-blood. Abbott has found that when the diphtheritic bacilli are directly injected into the testicles of the guinea-pig small inflammatory foci are found in the peritoneum and in the omentum which contain large numbers of organisms. In Abbott's cases, however, it would seem more probable that the presence of the organisms in these places should not be regarded as a definite infection of the tissues, but as a local inoculation. The testicle has an abundant supply of lymphatics which pass to the retro-peritoneal lymph glands and anastomose with the lymphatics of the peritoneum generally, and it is extremely probable that the bacilli were directly injected into the places where they were found. In the case in which Frosch found the organism in the tissues, he was only able to do so by using large quantities of the tissue for inoculating the tubes. It is possible that an occasional organism may enter into the blood and may be deposited in the organs, and he obtained them by using large quantities of the material, but this cannot be by any means constant, for the general weight of evidence is entirely opposite to this.

In the course of the investigations on diphtheria there were a number of cases in which mixed infection with diphtheria and other diseases was found. Dr. Williams has reported these cases in full. As might be supposed, scarlet fever was more frequently found associated with diphtheria than any other disease. One of the most interesting cases of mixed infection was that with typhoid fever. That pseudo-membranous inflammations of the throat appear in cases of typhoid fever has long been known; they have been especially described by Wagner. Wagner called attention to the fact that these pseudo-membranous inflammations of the throat accompanying typhoid fever were more frequent when epidemics of diphtheria prevailed at the same time. While it is not at all sure, or even probable, that all the pseudo-membranous inflammations of the pharynx in typhoid fever are due to the Klebs-Loeffler bacillus, this gives at least one positive case in which the organism was found. On the same day cultures were made from a case of virulent diphtheria, from a case of pseudo-membranous inflammation accompanying scarlet fever, and from a case of typhoid. In all three the identical organism was found. Inoculations of guinea-pigs were made at the same time from the cultures obtained from the three cases. All three of the guinea-pigs died within thirty-six hours, and the organisms were recovered from the inoculated animals in all cases. The pseudo-membranous inflammations accompanying typhoid are much more frequent than is generally supposed. That they are not more often recognized clinically is due to the fact that the hebetude of the patient prevents any symptoms of the throat affection from appearing; and this condition usually interferes with a thorough examination of the pharynx. In our experience the membrane is more apt to be found just at the beginning of the

œsophagus on the posterior pharynx wall than at any other place. Like the scarlet fever pseudo-membranes, it is very probable that they are generally produced by the streptococcus, but, so far as we know, no bacteriological examination has been made in these cases.

We have also found the diphtheria bacillus in one case of inflammation of the middle ear following diphtheria, and in two cases of inflammation of the middle ear following measles. In the two cases of measles there was no affection of the throat at the same time. Such cases represent accidental infection with the diphtheritic bacilli analogous to the accidental wound infections with the erysipelas organisms or with the pus organisms. We have had no cases of wound infection with diphtheria bacilli. The organism has also been found in cases of pseudo-membranous angina accompanying measles. Although here, as in scarlet fever, it is most probable that the organism which produces the pseudo-membrane is in most cases the streptococcus.

A great deal of interest has of late been excited by the cases in which, without any pseudo-membranous inflammation of the throat so far as could be seen, the Klebs-Loeffler bacillus has been found. Several such cases have been reported. In his early publication, Loeffler has reported one case in which the bacillus was found without any pseudo-membranous inflammation of the throat, and others have since been reported. It has been supposed in these cases that the disease could be produced without a local lesion. All of these cases, however, have been clinical. We know of no case in which the entire pharynx and respiratory tract, including the nares, has been examined for lesions. The lesions might be slight and could very well escape a purely clinical observation. Cases are not uncommon in which lesions have been found in the respiratory tract alone, and found in the nares alone. There have been a large number of cases of membranous rhinitis reported in which the diphtheritic bacilli have been found. The absence of the pseudo-membrane in the places where it is ordinarily found is by no means a proof that it is not present. All the essential symptoms of the disease—the internal lesions, the paralysis, the circulatory disturbances—are so clearly due, not to the presence of the bacilli themselves, but to a chemical poison produced in the local lesions, that we cannot conceive of a diphtheria without local lesions from which absorption can take place. All the lesions of the disease in the internal organs, including paralysis, are produced by inoculating animals with chemical products of the bacilli just as certainly as by the diphtheritic bacilli themselves.

Like other organisms, the Klebs-Loeffler bacillus varies greatly in virulence. A great deal of interest has been excited by what has been called the pseudo-diphtheritic bacillus. It is known that organisms are found which are apparently in morphology and culture identical with the Klebs-Loeffler bacillus, but which show a decided difference in

virulence. Inoculation of guinea-pigs with these bacilli is followed either by no results at all or by very slight local lesions without any general affection. They have been found in very slight lesions of the throat with a slight pseudo-membrane and without any systemic affection. They have also been found in severe local lesions. There can be little doubt now that this so-called pseudo-diphtheritic bacillus represents simply a modified less virulent form of the diphtheritic bacillus. Abbott has shown that around the seat of inoculation the same lesions are found, though different in extent, which are produced by the virulent organism. The most virulent cultures produce death in guinea-pigs in thirty-six hours, and ranging from this, depending on the virulence of the organism, either the duration of life after inoculation is lengthened or no effects are produced. The throat lesions which are produced by the modified organism may be fully as severe as when the virulent organism is present. In some cases the mildness of the course of the disease may be due, not to a modification of the virulence of the organism, but to lack of absorption. We have found cases in which there was apparently no absorption of the virus, although the membrane may be extensive, and the organism, as tested on guinea-pigs, may have the most virulent character. The patient declares himself well, and the pulse and the temperature are about normal.

There is no doubt that the danger in diphtheria lies chiefly in the absorption of the virus which is produced locally, and this does not take place with anything like the same readiness in adults as in children. This is probably due to the more delicate tissues of the child, its greater vulnerability and possibly a greater facility of absorption. It is very probable, however, that just as there are different degrees of susceptibility of the mucous membrane to the local action of the bacilli, so there are also differences in susceptibility to this systemic poisoning.

There are two methods by means of which diphtheritic bacilli, when present, may be detected. One is by means of the direct microscopical examination of the membrane. Small pieces of the membrane can be pulled off with forceps, or a pledget of cotton may be rubbed over the surface of the membrane, and afterward rubbed directly over cover-slips. These are then heated and stained by the usual methods. The staining which we have found uniformly best suited is the Loeffler solution of methylene-blue, consisting of methylene-blue dissolved in a weak solution of caustic potash. The bacilli are frequently present in large numbers; in other cases but few are seen. They may be distinguished by their form alone from the other organisms of the mouth, though there may be organisms present which very closely resemble them in form. As a rule they are not homogeneously deposited over the preparation, but are more apt to be found in small masses and clumps. The organisms with which they are most frequently found associated are the

various micrococci, which may be arranged either in chains or in the staphylococcus form. Along with the micrococci there may be present long or short bacilli varying greatly in size and curved forms. In rare cases they may be found in great numbers unmixed with other forms. As a general rule, the more abundant the various organisms which are found, the less the likelihood of the case being one of diphtheria.

While this method will certainly yield valuable results in the hands of the experienced investigator, there is always a considerable amount of difficulty in distinguishing the diphtheritic bacilli from other organisms. When present in large numbers and arranged in masses they can be readily distinguished, but when very few or single organisms are present it is impossible to distinguish them by form and size alone, and we have no method of distinguishing them by staining such as we have in the cases of tubercle bacilli. A much readier way is found in the methods of culture. In this we have, as the most available method to procure the material for culture, a pledget of cotton closely wrapped around the end of a wire. A number of these wires are prepared, enclosed in test-tubes and sterilized by heating in the hot-air sterilizer. After sterilization they are carried to the wards still enclosed in the test-tubes. The wire is then removed from the tube, and the cotton pledget is rubbed over the membrane. Frequently small pieces of it will adhere to it; then the test-tube is labelled and sent to the laboratory. At the laboratory cultures are made on the blood serum and sugar bouillon which was recommended by Loeffler. This is prepared in large quantities and kept on hand. It consists of blood serum obtained from the slaughter-house and mixed with one-fourth its volume of bouillon containing 1 per cent. of grape-sugar. This is then poured into test-tubes, from 10 to 15 c.c. being placed in each one, and these are then sterilized in a leaning position to give a large extent of surface. At first we always used the fractional sterilization, heating the material on successive days up to a temperature of 62°. So many of the tubes spoiled, however, that lately we have adopted the plan of heating it at once up to the boiling temperature, and then sterilizing it on successive days, just as we would with any other medium. The heat coagulates the blood serum and renders it opaque. The organisms grow on it with great readiness, and the opacity interferes very little with the proper recognition of the colonies. We have tried various media, human blood serum among others, but the organisms grow very much more readily upon serum derived from cattle than upon any other medium. The pledget of cotton on the end of the wire is rubbed over the slanting surface of the test-tube, which is then placed in a warm chamber. At the end of twenty hours, if diphtheritic bacilli are present an abundant growth will be found on the surface of the test-tube. The organisms grow as small isolated colonies, frequently scattered over the surface.

Of course the swab from the throat contains in almost all cases numerous other organisms, as well as the diphtheritic bacilli, and if all these organisms grow equally well it would be impossible to distinguish the different species. Fortunately, however, but few of the organisms found in the throat find suitable conditions for their growth in our ordinary modes of culture. The diphtheritic bacilli may be found alone, but usually other forms, both micrococci and bacilli, are found with it. The micrococci are usually the diplococcus lanceolatus, streptococci, and staphylococci. Streptococci are more frequent than other forms. One of the most common bacilli found is a short organism growing in pairs with pointed extremities. There is nothing absolutely characteristic of the macroscopic appearance of the growth of the diphtheritic bacillus in these primary cultures, although pure cultures on test-tubes made from these primary cultures are more characteristic. It is impossible to tell by the macroscopic appearance the colonies of diphtheritic bacilli from the colonies of both streptococci and staphylococci. After twenty to twenty-four hours the cultures are removed from the culture chamber and the various colonies are examined microscopically. The masses of bacilli in the colonies are recognized in this way much more easily than by the simple direct examination of preparations made from the throat. In doubtful cases it is always well to make inoculations on animals.

There can be no doubt of the importance of such investigations. When we can make a perfectly definite diagnosis, we know what we are doing; we know that in certain cases we have to do with the true diphtheritic organism, and in other cases with only a mild and possibly non-infectious organism. It is impossible to separate the cases of diphtheria from other pseudo-membranous inflammations in any other way. We know that cases in which the virulent organism is found may run a very light clinical course, and without the presence of the bacillus we might not think it necessary to guard against infection. In the absence of a definite diagnosis made by bacteriological investigation, the only safe way is to consider every case in which pseudo-membranous inflammation of the throat is found, whatever its character, however mild the clinical symptoms may be, as a case of true infectious diphtheria.

Of late considerable attention has been given to the pseudo-diphtheritic, or, as they have been called, the diphtheroid affections of the throat. By this we do not mean cases of pseudo-membranous inflammation simulating the pseudo-membranous inflammations found in diphtheria, but other inflammations of the throat in which the appearances simulate a pseudo-membrane. Too frequently in practice every sort of white deposit and discoloration in the pharynx is regarded as a membrane. The membrane found in the membranous inflammation is perfectly distinct anatomically, whatever may be its etiology. It is always dense and firm and is made up of fibrin and degenerated cells.

In the diphtheroid inflammations we may have masses of detritus consisting of cast-off epithelium, mucus, and masses of bacteria collected on the surface of the mucous membrane, and frequently extending into the follicles. This can easily be told from the membranes, because on touching it with the needle, the latter sinks into it, and it can be removed, not as a membrane, but as a more or less granular mass. Examining under the microscope the whitish deposit is frequently seen to be composed almost entirely of masses of bacteria of the most varied forms. We find it in quantities of bacteria, spirilla, and micrococci. It is evident that these organisms find in the collections of mucus and cast-off epithelium a suitable culture media, and they grow and develop in this. Sometimes these deposits are accompanied by considerable swelling, irritation and other evidences of inflammation; and when removed there may be here and there a very slight fibrinous inflammation beneath them. It is not uncommon to have a high fever and considerable constitutional disturbance in these cases, but the condition runs its course in a few days, and is attended with but little danger.

RIFLE PRACTICE IN ITS RELATIONS TO EYE-STRAIN.

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SINCE rifle practice has become a matter of such vital interest to the officers and enlisted men of the United States Army and National Guard, its causative relation to eye-strain has assumed an importance that demands more attention on the part of the medical staff of both services than has heretofore been devoted to it. Hence, it has appeared *à propos* to the writer to attempt a discussion of the matter, pointing out the dangers of the present system so far as the eye is concerned, and advising such a modification of the system as shall be less likely to cause ocular trouble in the future.

This subject will be discussed under the following heads: I. The defects of the present system in its relation to eye-strain. II. In what respects the present system should be modified.

I. THE DEFECTS OF THE PRESENT SYSTEM IN ITS RELATION TO EYE-STRAIN.

1. *As regards the color of the targets.*

The color of the targets, used in known distance firing, is a light buff, the bull's-eyes and rings being black. Light is reflected from these

targets with almost as much intensity as from a white surface, and no one can realize the dazzling effect produced unless he has faced such a target for several hours under a bright sun. Then, when we remember that the soldier, or officer, as the case may be, is required to aim at this bright surface, and, in the effort to properly adjust the sights of his rifle upon the target, strain his accommodation in the face of the glare, it is a matter for wonder that even more eyes have not succumbed to such cruel and unwise treatment, which sets at utter defiance the laws of ocular hygiene. At most of our frontier military posts, as well as at the majority of the target ranges of the National Guard, the glare during the target season is intense, and especially is this the case at the posts located in Indian Territory, Texas, Arizona, and New Mexico. In the two last-mentioned Territories, the target ranges—with the whole face of the country, for that matter—are destitute of trees, and, during the target season the ground and the targets are of the same buff tint, with scarcely a trace of verdure to relieve the eye. Imagine one practising at a light-buff target under these circumstances, with the bull's-eye dancing in the brilliant sunlight as if bewitched! In the case of the scorers, and of the officers in charge of the practice, the inconvenience resulting from gazing intently at these blazing targets is second only to that experienced by the soldiers engaged in firing. Some officers have attempted to secure protection from the intolerable glare by the use of smoked glasses; but this partial relief is denied the marksman, as he must make use of the full amount of his visual acuteness in order to fire with the best result. Under such circumstances, any masked refractive error is very prone to manifest itself, with the accompanying symptoms of eye-strain. Such treatment is injurious enough to the normal eye, but it is especially hurtful to the hypermetropic or astigmatic organ.

2. *As regards the damage done to the eyes in cases of refractive error.*

In this connection it seems advisable, as a preliminary, to explain, in a manner that may be easily understood by the general practitioner, what is meant by the terms *far point*, *near point*, *visual acuteness*, *accommodation*, *emmetropia*, *myopia*, *hypermetropia*, and *astigmatism*, as a proper appreciation of the meaning of these terms, as well as of the refractive conditions indicated by the last four, is necessary to the clear understanding of the discussion contained in the following pages.

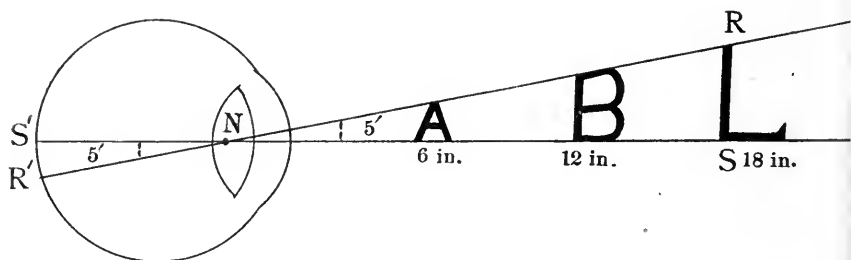
a. The *far point* is that point for which the eye is adjusted when the accommodation is at rest.

b. The *near point* is that point for which the eye is adjusted when the full power of accommodation is called into play. For instance, if an individual can distinguish fine print at a distance of eight inches from the eye, but no nearer, then the *near point* of such an eye is at *eight inches*.

c. *Visual acuteness* is "the power of recognizing form," and the standard adopted by oculists is the power of recognizing an object that subtends an angle of five minutes ($5'$) at the nodal point of the eye.

In Fig. 1, the point N in the crystalline lens is the nodal point, and the rays RR' and SS' , which come from the extremities of the letter L, intersect at this point, and the angle RNS ($= R'NS'$) formed by them at N, is the angle subtended by the letter. An eye that can recognize an object which subtends an angle of five minutes at the nodal point is said to possess the normal acuteness of vision. In the figure, it is evident that the other letters, A and B, subtend the same angle. It requires the same degree of visual acuteness to recognize A at 6 inches, B at 12 inches, and L at 18 inches. It must be distinctly understood that *the possession of the normal acuteness of vision, as indicated above, does not exclude the possible existence of errors of refraction.*

FIG. 1.



d. *Accommodation* may be defined as the power possessed by the eye of altering its focus, as may be necessary, for the proper perception of near objects. By the exercise of this power, the refraction of the eye is increased, and near work made possible. Accommodation is due to a little muscle in the eyeball, called the ciliary muscle, which, by its contraction, draws forward the choroid, and thus relaxes the suspensory ligament, or zonula of Zinn, in consequence of which relaxation the inherent elasticity of the crystalline lens is enabled to assert itself with a resulting increase in the convexity of the latter. This increase in the convexity of the lens enables rays of light, emanating from near objects, to be properly focussed upon the sensitive elements of the retina. In the ideal, or normal, eye no accommodation is required for objects at twenty feet or beyond, since, in practical ophthalmology, rays coming from this distance are considered to come from infinity, and, hence, to be parallel, and the theoretically perfect eye is adapted to such rays. This is not true, however, of the eye whose refraction is *not* normal, as will be explained later on. The amount of accommodative effort necessary for distinct vision within infinity (twenty feet), and the distance of the object

from the eye are inversely proportional—the shorter the distance the greater the accommodative effort.

The power of the accommodation does not remain fixed through life, but at the age of ten years begins to decline rapidly and regularly until it reaches the zero limit at seventy-five years of age. The following table gives the power of accommodation possessed by the eye at different ages.¹ The letter D means “dioptré,” and signifies the refractive power possessed by a lens of one metre (about forty inches) focal length, which is the standard lens of the metric system. This system of designating lenses (metric system) is now almost universally used by oculists, instead of the old inch system :

Years.	Power of Accommodation.
10	14 D.
15	12 D.
20	10 D.
25	8.5 D.
30	7.0 D.
35	5.5 D.
40	4.5 D.
45	3.5 D.
50	2.5 D.
55	1.75 D.
60	1.00 D.
65	0.75 D.
70	0.25 D.
75	0.00 D.

The excuse for the insertion of this table is the fact that it will be necessary to refer to certain data contained in it at a later phase of this discussion.

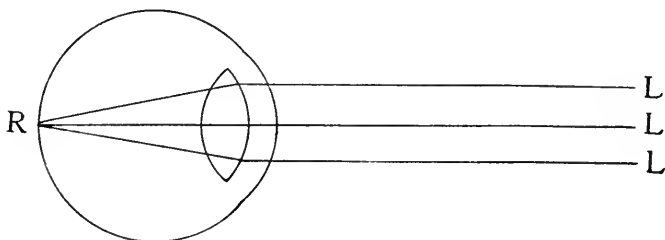
It may be well to state here that this failure of the accommodative power with increasing years is due to the fact that the elasticity of the crystalline lens progressively diminishes, as a result of which the contractions of the ciliary muscle are not followed by a commensurate increase in the convexity of the lens. In certain refractive conditions, to be explained further on, distinct vision, for both distant and near objects, is possible only at the expense of an habitually increased accommodative effort, by means of which the individual is enabled to overcome his refractive error and obtain the normal acuteness of vision. This statement applies to errors of moderate degree in comparatively young subjects.

e. Emmetropia is the theoretically normal state of refraction, and may be defined as that refractive condition which, with the accommodation at perfect rest, permits of the focussing of parallel rays of light upon the

¹ See Landolt: The Refraction and Accommodation of the Eye, p. 178.

retina, or, in other words, the retina is situated at the focus of the dioptric system of the eye. Such an eye is adapted to *parallel* rays, and the far point is at infinity. This condition is illustrated in Fig. 2.

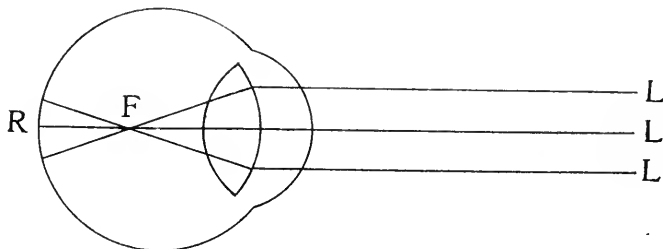
FIG. 2.



Parallel rays, L L L, are brought to a focus upon the retina at R. In this and the following refractive conditions it is assumed that the accommodation is at perfect rest, the *static refraction* being meant.

f. *Myopia* (near-sight) is that state of the refraction which causes parallel rays to be focussed *in front of the retina*, or the retina may be said to be *behind the focus* of the dioptric system, as shown in Fig. 3.

FIG. 3.

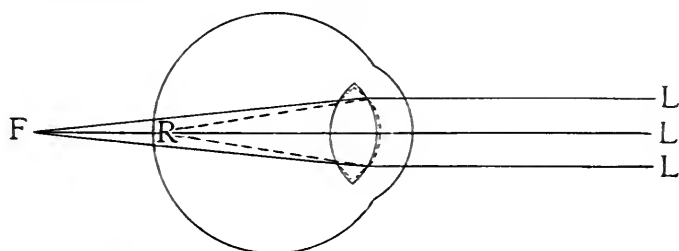


In myopia the eyeball is virtually *too long* in its antero-posterior diameter. Such an eye is adapted to *divergent* rays, and its *far point* is at a finite distance *in front of* the cornea, and positive.

g. *Hypermetropia* (far-sight) is that refractive condition in which parallel rays are focussed at a point *behind the retina*. The retina is *in front of the focus* of the dioptric system of the eye. The hypermetropic eye is adapted to *convergent* rays, which do not exist in nature, and hence accommodation is necessary for all distances, both far and near, since by this means alone can parallel or divergent rays be given the proper degree of convergence to be focussed upon the retina. In Fig. 4 the focus of the dioptric system is at F, a point behind the eyeball, and the parallel rays, L L L, are represented as focussed at this point. The dotted lines show the direction that these rays should take in order to

be focussed upon the retina at R, and the dotted curve represents the change in shape of the crystalline lens, under the influence of the contraction of the ciliary muscle, necessary to give the rays, L L L, the required direction.

FIG. 4.



The hypermetropic eye is *too short* in its antero-posterior diameter, and its *far point* is *behind* the eye, and negative.

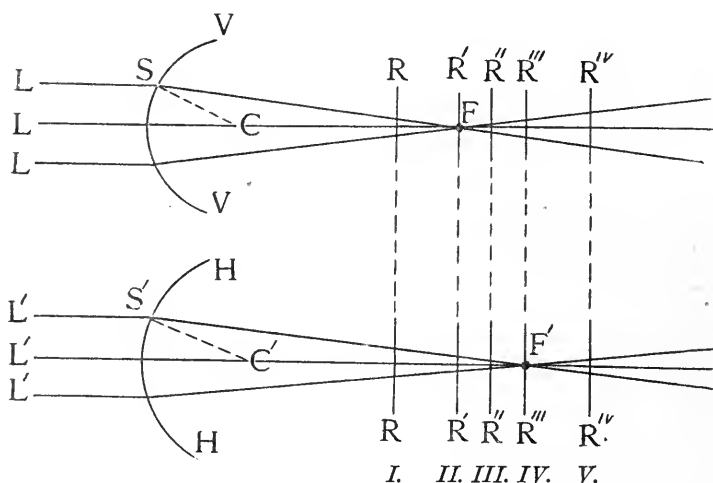
h. Astigmatism (*a*, privative; *στίγμα*, a point) is that refractive condition in which the different meridians of the refractive apparatus have different powers of refraction, and hence the rays of a cylinder of light entering the eye are not brought to a focus at *one point*. This condition is due to a *difference in curvature of the meridians of the cornea*. The meridians of *greatest* and *least* refraction, called *principal meridians*, are at right angles to each other, and the refractive power of the intervening meridians diminishes gradually from that of the meridian of *greatest* to that of the meridian of *least* refraction. This constitutes *regular astigmatism*, which falls within the scope of this paper. It can readily be understood that rays passing through the meridian of *greatest* refraction will be brought to a focus *sooner* than those passing through the meridian of *least* refraction. This, while seemingly abstruse in the telling, can be readily understood by referring to Fig. 5.

Regular astigmatism is subdivided into five varieties, which are individually determined by the relative positions of the retina and of the foci of the principal meridians. From what has been said of the relative positions of the retina and foci of the dioptric system in hypermetropia and myopia, the reader should have no difficulty in comprehending the different varieties of astigmatism as exemplified in Fig. 5 (which is an adaptation from Landoldt).

A single curved surface is here used to represent the refractive apparatus of the eye. Let VV represent the vertical meridian, and be the meridian of *greatest* curvature, with the centre of curvature at C; parallel rays (L L L) will be focussed by this meridian at F. Now let HH be the horizontal meridian of the same curved surface, and let it represent the meridian of *least* curvature, the centre of curvature being at C'; then parallel rays (L' L' L') will be focussed by this meridian at F'. It is

seen from the figure that the focus F is nearer the refracting surface than is the focus F' . Of course, the planes of the two meridians, VV and HH , are at right angles to each other. Such a condition in the human eye constitutes astigmatism. As before mentioned, the position of the retina with reference to the foci of the two principal meridians determines the special variety of astigmatism in each case.

FIG. 5.



Returning to our figure, let the screens RR , $R'R'$, $R''R''$, etc., represent the retina as it occupies positions *I*, *II*, *III*, etc. Now, if we place the screen at *I*. (so that it occupies the position indicated by RR), we find that it is *in front of the foci* of both meridians; hence, both meridians are *hypermetropic*, though in *different degrees*, and we have an illustration of *compound hypermetropic astigmatism*. Place the screen ($R'R'$) at *II*, and we find that it *corresponds with the focus* (F) of the *vertical* meridian, which is therefore *emmetropic*, but is still *in front of the focus* (F') of the *horizontal* meridian, which is consequently *hypermetropic*. Here we have an illustration of *simple hypermetropic astigmatism*, in which one meridian is *emmetropic* and the other *hypermetropic*. At *III*. the screen ($R''R''$) is *between the foci* of the two meridians, that of the vertical meridian being in front of it, and that of the horizontal meridian behind it; hence the former meridian is *myopic* and the latter *hypermetropic*, and our figure illustrates a case of *mixed astigmatism*. With the screen ($R'''R'''$) at *IV*., it *corresponds with the focus* (F') of the meridian of least curvature, and is behind the focus (F) of the meridian of greatest curvature, giving us an example of *simple myopic astigmatism*, in which the former meridian is *emmetropic* and the latter *myopic*. If we move our screen ($R''''R''''$) still further from the refracting surface, and

let it occupy position *V*., it will be *behind the foci* of both principal meridians, and we have a representation of *compound myopic astigmatism*, in which both meridians are *myopic*, though in different degrees.

To recapitulate:

- I.* represents compound hypermetropic astigmatism.
- II.* “ simple hypermetropic astigmatism.
- III.* “ mixed astigmatism.
- IV.* “ simple myopic astigmatism.
- V.* “ compound myopic astigmatism.

I shall now attempt to make an application to target practice of the facts stated in the foregoing remarks upon refraction and accommodation. From what has already been stated, it can readily be seen that the emmetrope, possessed of normal visual acuteness, can, in aiming at the target, see the bull's-eye distinctly with the accommodation perfectly relaxed, but must make use of his accommodation in order to secure accurate perception of the front and rear sights of his rifle, which are situated at finite distances from the eye. I have determined, by experiment, that the average distance of the eye from the *front* and *rear* sights of the United States Springfield rifle, when firing in the standing or sitting positions, is 110 cm. for the former and 43.1 cm. for the latter—an accommodative effort, therefore, of 0.90 D. being required in the one case, and 2.32 D. in the other. Under proper conditions of ocular hygiene, the emmetropic eye should experience no trouble from constantly bringing this amount of accommodation into play, but, when its use becomes necessary in the face of a dazzling target, matters are decidedly changed. The effect is very similar to that experienced when one attempts to read a newspaper in the bright sunlight, or look fixedly, under the same conditions of light, at a dark object on a whitewashed wall. Such use, even of the normal eye, if continued from day to day, and for an hour or two at a time, for several weeks, will be very apt to bring on serious symptoms of eye-strain; accommodative asthenopia, and congestion of the retina and other structures in the interior of the globe, resulting. Yet this is exactly what the soldier in the United States Army is required to do during the “target season.”

In hypermetropia and astigmatism trouble is far more likely to result from this constant firing at the present brilliant target than in the case of emmetropia, just mentioned, for the simple reason that more accommodative strain is required in these refractive conditions.

As before explained, in the case of the hypermetropic eye, accommodation is necessary *for all distances*, the amount of accommodation required in any given case being dependent upon the degree of the refractive error and the distance of the object viewed from the eye. In looking at the target, which the emmetrope can perceive distinctly without use of his accommodation, the hypermetrope is required to bring

into play enough accommodation to overcome his error (or, in other words, to give to parallel rays the degree of convergence necessary to their accurate focussing upon the retina) before he can see the bull's-eye. Furthermore, in adjusting his refraction to the sights of his rifle, the hypermetrope must, in each case, make use of this amount of accommodation (*i. e.*, an amount sufficient to overcome his error) over and above that required by the emmetrope under like conditions. In other words, a hypermetrope of 2 D. must constantly make use of 2 D. of accommodation in excess of the amount necessary for the emmetrope.

Much greater strain is placed upon the ciliary muscle in astigmatism than in hypermetropia. Of course, distinct vision without glasses is only possible in the lower degrees of astigmatism, and it is of such degrees that these remarks are made. In order to overcome an astigmatism and secure distinct vision, when such a result is possible, certain segments, or zones, of the ciliary muscle must contract more strongly than others, producing in this way a condition of artificial compensatory lenticular astigmatism, if I may be permitted the coining of such an expression, which is the converse of the refractive condition of the cornea, and hence neutralizes the effect of the latter. Of course, the crystalline lens becomes most convex in the direction of the most strongly contracting segment of the ciliary muscle. Since the hypermetropic forms of astigmatism are the kinds almost invariably found in soldiers, the following remarks apply to these varieties alone, mixed astigmatism and the forms of myopic astigmatism being excluded.

This neutralizing of the corneal astigmatism by irregular contraction of the ciliary muscle, as above explained, is, in the case of the soldier affected with hypermetropic astigmatism, necessary in order that he may focus parallel rays upon the retina, or, in other words, see distinctly at twenty feet or beyond. Hence, before he can see the bull's-eye, he must thus *overcome his error*, and must, *in addition*, bring into play a general (or regular) contraction of the ciliary muscle, as explained in the case of the hypermetrope, sufficient to enable him to see the sights of his rifle.

From the above description it can easily be understood why the astigmatic soldier is so much more liable to suffer from eye-strain, as a result of rifle practice, than the emmetrope. What was said of the direct effect upon the emmetropic eye of constant firing at the present target applies, therefore, with far greater force to the astigmatic and hypermetropic organs.

So far, it has been assumed that the individuals affected with ametropia have been possessed of sufficient accommodation to overcome their respective errors; but the factor of age must now be taken into consideration. It has already been stated that, owing to a progressive diminution in the elasticity of the lens, the accommodative power diminishes

rapidly and regularly from the age of ten years, when it amounts to 14 D., to that of seventy-five years, when it becomes zero. By referring to the table given on a preceding page, it can well be understood how a soldier of twenty or twenty-five years of age, when the accommodative power is 10 D. and 8.5 D. respectively, might easily overcome an error of refraction which would cause great strain of the ciliary muscle, or be insurmountable, by the time he reaches the ages of thirty, thirty-five, or forty years, when the amplitude of the accommodation falls to 7 D., 5.5 D., and 4.5 D.

It is especially in the younger soldiers, who have moderate degrees of refractive error not incompatible with distinct vision under accommodative effort,¹ that we may expect to find asthenopia. By the time these subjects reach the age of twenty-five years any strain of accommodation is almost sure to cause trouble, for by that time the accommodative power having fallen to 8.5 D., is no longer able to overcome their errors *and leave enough accommodation in reserve for constant work*. It is a fact well understood by ophthalmologists that, for constant use, a certain proportion of the total range of accommodation (about one-third or one-fourth)¹ must be left in reserve, and that all the accommodation can no more be brought into play and kept constantly engaged without fatigue than can any other muscular power.

Now, our soldier of twenty-five years having been during the whole of his previous life accustomed to distinct vision, his visual centres will not brook any dimming of visual perceptions, but demand sharply cut retinal images, and hence the flagging ciliary muscle is spurred on to greater and greater efforts, until severe eye-strain results. In the higher degrees of ametropia (such as would not be likely to be found among soldiers, owing to the examination for enlistment), vision never having been distinct, so much is not required of the ciliary muscle; hence, eye-strain is not so liable to come on. In these cases the visual centres content themselves with the impressions received from the circles of diffusion formed on the retina, and do not realize the need of accurate focussing.

Now, while upon this subject, another element must be touched upon, namely, the part played by the extrinsic eye-muscles in the production of the composite condition called eye-strain. In refractive errors the normal balance between the ocular muscles is not as well sustained as in emmetropia, and, as a consequence, the so-called muscular asthenopia is very prone to occur under conditions of unwise use of the eyes. This condition of muscular asthenopia results in these cases from a disturbance of the normal relations existing between the functions of convergence and accommodation. When this condition is induced in an

¹ See Landolt: *The Refraction and Accommodation of the Eye*, p. 339.

ametropic individual the state of such a person is far from pleasant. All near work becomes painful; headaches, pain in the back of the neck, dizziness, nausea, and other disagreeable symptoms soon follow any special use of the eyes.

I can speak feelingly on this point, since, in consequence of a season of target practice in 1883, when I stood number one in order of merit in a post garrisoned by headquarters, band, and five companies of the 14th United States Infantry, I developed a condition of muscular asthenopia (insufficiency of the internal recti muscles) which gave me the greatest annoyance for several years. I am a hypermetrope to the extent of 1.50 D., but was not aware of this fact until the eye-strain developed just after the target season mentioned.

Myopia is not frequent among the soldiers of the regular Army; indeed, I have never seen a myopic enlisted man whose error was greater than 1 D.; but myopes must be comparatively common among the members of the National Guard, of whom a preliminary physical examination is not usually required. Hence the following statements concerning the effects of "target practice" upon the myopic eye apply especially to the latter organization.

In myopia, vision for distance cannot be improved by accommodative effort, since, even with the accommodation at rest, the dioptric system of the myopic eye is *already too highly refractive*, and rays of light coming from twenty feet or more (parallel rays) are focussed in front of the retina, and then projected upon this structure in circles of diffusion. The myope, therefore, only calls upon his accommodation for distances *within his far point*, which is situated at a finite distance in front of the eye; consequently he habitually makes use of less accommodation than the emmetrope, by the degree of his refractive error. Thus, to read fine print at 33 cm. would require in the emmetrope about 3 D. of accommodation ($\frac{1}{\frac{1}{3}} \text{m.} = \frac{1}{\frac{1}{3}} \text{cm.} = 3 \text{ D.}$), whereas, in the case of a myope of 2 D., for instance, only 1 D. would be necessary to do the same work ($3 \text{ D.} - 2 \text{ D.} = 1 \text{ D.}$); in the case of a myopia of 3 D., no accommodation at all would be needed for this distance (33 cm.), since the individual's *far point* would be at exactly this distance from the eye ($\frac{1}{\frac{1}{3}} = 33$). In consequence of this diminished use of the ciliary muscle, we find this structure flatter and less strongly developed in myopia than in emmetropia, the circular fibres of the muscle, which are supposed to have most to do with accommodation, being especially defective.¹

A myope of even 1 D. cannot see the bull's-eye distinctly, distinct vision for distance in this refractive condition being only possible with the aid of concave lenses.

¹ See Fuchs: Text-book of Ophthalmology, pp. 635 and 636.

The ranks of the National Guard being recruited, as a general thing, from an intelligent class, it is a rule that the myopes of this organization are aware of their ocular defects, and have the same corrected by proper glasses, so that this part of the discussion is narrowed down to the effect of "target practice" upon the myopic eye provided with the proper correction.

Concave glasses, as is well known, call accommodation into play—the stronger the glass the greater the accommodative effort—and frequently myopes, whose accommodative power is not what it should be, cannot stand the full correction, even for distance. Every oculist has frequently in these cases to *under-correct*, and, moreover, even in moderate degrees (about 4 D.), to prescribe still weaker concave lenses for near work, for although, theoretically, myopes of about 4 D. and less are supposed to use this correction for near work as well as distance, practically many patients cannot stand the increased accommodative effort necessary in the former case. Hence, such persons are provided with two pairs of glasses—one for distance, and a weaker pair, adapted to the patient's working distance, for near work.

Now, to return to our myopic soldier: suppose him to be moderately myopic, and to wear his full correction in order to see the bull's-eye. Of course, he cannot make use of one pair of glasses for the bull's-eye, and another weaker pair for the sights of his rifle, but must use his full correction for all. Hence, it can well be understood that his poorly developed ciliary muscle may prove unequal to the task when firing at a brilliant target, and accommodative troubles result, as described in the case of the emmetrope. Muscular asthenopia is also apt to occur, but far greater dangers than these menace the myope whose eyes are abused.

Myopia is essentially an acquired condition, being rarely congenital. In the immense majority of cases infants are born hypermetropic. The late Dr. Ely, of New York, examined with the ophthalmoscope the eyes of one hundred infants, and found that nearly all of them had "the short eyeball."¹ The same results have been obtained by other observers. Now, if at birth the eye is, as a rule, hypermetropic, how is it that myopia is induced, or, in other words, what causes the faulty elongation of the globe?

It is the universal opinion of ophthalmologists that the cause of this acquired myopia must be attributed to the constant demands made upon the eyes by near work. In the first place, it is assumed that in such cases there is an adherent anatomical weakness in the posterior pole of the globe, principally located in the sclera, which fact would render the eyeball prone to elongate in this direction, if subjected to lateral com-

¹ See Valk: Errors of Refraction, p. 44.

pression, or if from any other cause the intra-ocular pressure should be somewhat increased.

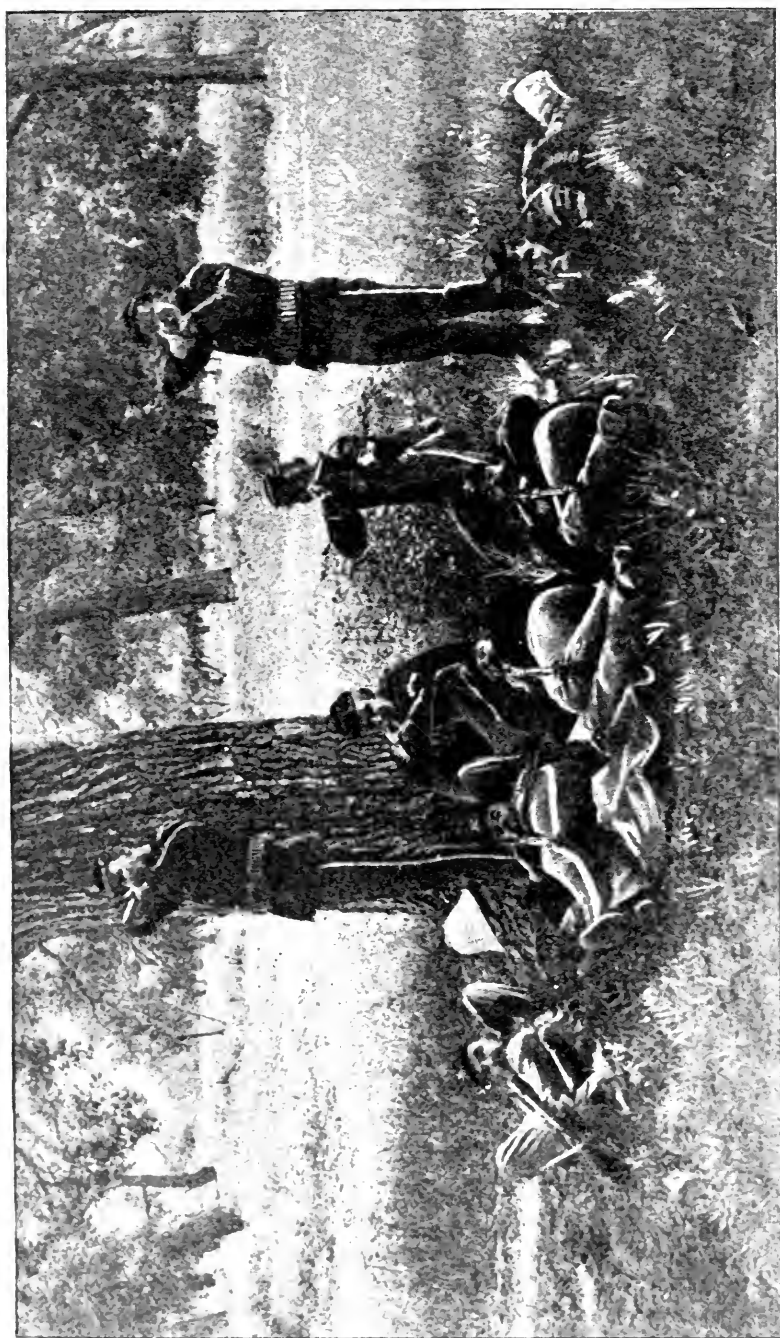
Now, in the production or increase of this ectasis at the weakened posterior pole, no matter in what way this weakness may have been induced, we find the following active agents: 1. The extrinsic ocular muscles, notably the four recti, which, when even in their accustomed state of tonic contraction, press upon the globe, but whose action in this regard is greatly increased in the act of convergence for near work. Moreover, the superior and inferior oblique muscles, encircling the globe as they do, compress it at its equator, and thus press upon the points of exit of some of the venæ vorticosæ with a resulting turgescence of these vessels in the choroid, and a consequent increase of the intra-ocular pressure.¹ 2. The exercise of the accommodation, which is held by many authorities, notably Landolt, to increase the intra-ocular pressure. 3. A faulty position of the head and body (as in bending forward in near work, or using the eyes while in the recumbent posture) which causes a condition of hyperæmia in the interior of the eyeball, both from increased flow of blood to the organ and from the compression to which the veins in the neck are subjected, with a resulting increase in the intra-ocular pressure.² It can also be well understood how harmful the congestion thus induced would be in case the choroid should be diseased or there should be a commencing posterior sclerotic-choroiditis. 4. Improper illumination, either *insufficient* (in consequence of which the work is held too near at hand, and the convergence and accommodation increased to a harmful degree), or *too brilliant* (causing irritation of the eye and rendering the internal structures hyperæmic), or *badly directed*, as, for instance, light shining directly into the eyes, in consequence of the source of light being in front of the individual, which, when conjoined with increased brilliancy, intensifies the bad results of the latter. 5. The traction exercised upon the weakened posterior pole by the optic nerve in strong convergence (Fuchs). In the act of convergence the posterior pole of the elongated globe is turned outward to a greater degree than in the case of the normal eye, and, as a result, the counter-traction of the optic nerve tends to still further increase the ectasis.

Now, place our myopic guardsman, provided with his proper correction, in front of the target and apply the above facts to *his* case. In the *first* place, he has in front of him a bright glaring target, at which he must aim (radically improper illumination); in the *second*, his eyeballs are compressed by the ocular muscles in producing the convergence called for when he attempts to focus the sights of his rifle, especially the rear

¹ See Fuchs: Text-book of Ophthalmology, p. 639.

² See Hartridge: On Refraction, p. 145.

FIG. 6.



sight (for, although one eye may be covered by the lid, it will, nevertheless, turn inward from sympathy with the uncovered organ); in the *third* place, by reason of the increased accommodation rendered necessary by the correcting lenses worn, the intra-ocular pressure may still further be increased; and in the *fourth* place, by his head being bent forward and turned sideways (generally to the right), in the act of aiming at the target, the bad results of faulty position (congestion of the intra-ocular tissues, both from increased flow of blood to the interior of the eyeball and from pressure upon the veins in the neck) are induced.

Could our myope be placed under conditions much more unfavorable? If he has a tendency to choroidal disease, this may be precipitated; a slumbering posterior sclerotico-choroiditis may be aroused into pernicious activity, with the result of rendering his myopia progressive; asthenopia, both accommodative and muscular, may be caused; and, finally, in older subjects with a high degree of error and fluid vitreous, it is remotely possible that detachment of the retina may ensue.

From what I know of target practice, after over fourteen years' experience as a member of the Medical Corps of the United States Army, I would not advise myopes of a greater degree of error than 2 D. to engage in this military duty.

From what has already been stated, it can easily be understood how the various recumbent positions in long-range firing under the present system of target practice are radically wrong from an eye standpoint. The least objectionable is the *prone position*, since in this the veins in the neck are compressed to a less degree than in the various back and side positions, and hence there is in the former case less consequent congestion of the intra-ocular tissues. The back and side postures are especially injurious, as the reader can easily imagine if he will examine the accompanying illustration, which shows the various permissible positions in target practice as at present conducted in the United States Army. This illustration is copied from a photograph, the work of Captain Sumner Lincoln, of the 10th United States Infantry, to whom I am indebted for the same.

II. IN WHAT RESPECTS THE PRESENT SYSTEM SHOULD BE MODIFIED.

In the first place, the color of the targets should be changed by all means, and the element of glare reduced to a minimum. This can easily be effected by making the *body of the target black* and the *bull's-eye and rings buff*. By this simple change the reflection of light from the target could be almost entirely obviated, since the only visible reflecting surface in this case would be the bull's-eye. Everyone knows that the *black target will absorb light*, instead of reflecting it. Another gain in this change would be the greater contrast produced between the color of the

target and the face of the landscape, which would be a great advantage at most of our military posts, as before explained.

If any "doubting Thomas" among the members of the shooting fraternity will construct such a target, and place it on a bright day by the side of the present regulation target, he will see the force of these remarks.

It may be claimed as an objection to the proposed target, that such good scores may not be obtained with it as with the one now in use. This objection would prove untenable, since *I have had this matter tested practically at the different ranges*, with the most encouraging results. I believe that better scores can be made with the black target than have heretofore been possible. Furthermore, the relief to the marksman's eyes would be of incalculable advantage.

At present most marksmen aim at the body of the target just below and a little to the left of the black bull's-eye; with the proposed target the front sight of the rifle could be outlined against the bull's-eye itself, which would simply cause a slight change in the elevation of the piece, and in the "windage" and "drift" allowed for.

In the second place, as some recumbent posture seems essential to good long-range shooting, I recommend, for reasons already stated, that the *prone position* be made the sole regulation recumbent position, and that the *back* and *side postures* be excluded. The evil effects upon the eye of faulty position have already been sufficiently discussed in the preceding pages, and it is now only necessary to refer to this fact.

I desire to say, in conclusion, that this paper is not intended as an attack upon rifle practice, but is written with a desire to obviate the evil effects, as far as the eye is concerned, likely to result from the performance of this military duty.

FORT LEAVENWORTH, KANSAS.

CONGENITAL STRICTURE OF THE ŒSOPHAGUS: WITH REPORT OF A CASE.

BY EMIL MAYER, M.D.,
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THE very rare occurrence of congenital stricture of the œsophagus, the duration before obtaining relief, and the fact of the patient having lived for nearly nine years on an entirely liquid diet, make this case of especial interest.

Edith Jackson S. was brought to the New York Eye and Ear Infirmary, March 5, 1892, to be treated for "some trouble when she swallowed." Her mother, who accompanied her, gave the following history: Edith was born on July 5th, nine years ago. As an infant she regurgitated very freely and to such an extent that preparations to receive rejected matter were always requisite. It was especially noticed that not only food was ejected, but also large quantities of ropy mucus.

This occurred during the nursing period of the first fourteen months of her existence, as also for some time after. After being weaned, attempts to feed her with pap and other semisolids were made, with the invariable result of regurgitation. The food thus given was taken with avidity, and some minutes thereafter she would masticate; there was absolutely no contraction of the abdominal muscles, as in vomiting, and the food would slowly be dropped out of the mouth. There was no sickness whatever during these regurgitations, and immediately afterward she would cry for more food, and take it, only to repeat the process. Her mother soon learned to keep her on liquid diet only; as the child grew older, bread, cake, meats, and other solids were given her, with the invariable result of regurgitation a few minutes afterward. Food has remained as long as ten minutes and then it began to return to the mouth until it was all ejected. Liquids have never been swallowed in large quantities at a time, the child sipping them very slowly from a teaspoon. For nine years the child lived on milk and beef-tea, getting ravenously hungry and yet unable to successfully swallow any solid whatever. At the age of three she nearly died of exhaustion, but nutritive enemata and concentrated foods tided her over. With the exception of an attack of pertussis and one of varicella in early childhood she has had no other illness. The family history is not of the best. Her father died of phthisis when she was seven years old, and two of her father's sisters died of the same disease. She has two younger sisters, both of whom are well.

Examination. Patient is very small and thin, and weighs thirty-five pounds. There is no color in her face; lips and conjunctivæ pale. Pulse 100, and not strong. In an attempt to swallow water she sips a little at a time. The child is apprehensive and rebellious.

The diagnosis made was stricture of the œsophagus. With the concurrence of Dr. Asch, who saw the case with me, the patient was directed to come again, prepared for examination under ether. On March 9, 1892, she was etherized in the operating-room, by the house surgeon, in the presence of Drs. M. J. Asch, Leonard, Weil, Van Fleet, and myself. When thoroughly anæsthetized, her head and shoulders were supported by an assistant, a mouth-gag was adjusted, and a warmed and lubricated bulbous bougie of a diameter of 6 millimetres was carefully introduced. A distinct grasping of the bulb was felt at the lower end of the œsophagus. A larger-sized bougie was now introduced and immediately removed. Patient rallied well after etherization.

On March 16th patient reported no ill effects from ether nor from introduction of the bougie.

An œsophageal bougie of full size, No. 18 of the English scale, measuring 9 millimetres, was thoroughly softened, warmed, and lubricated. The mouth-gag was applied, with the child held in its mother's lap, and the bougie carefully introduced into the stomach. The compression was felt at its lower end. The bougie was then withdrawn. The effect of this second introduction was wonderful: She was very thirsty after leaving the Infirmary, and drank, hastily and greedily, a pint of milk. She gulped it down. This was about fifteen minutes after the introduction of the bougie. An hour after she took three glasses of milk and ate an egg. The large-sized œsophageal bougies were introduced bi-weekly for four weeks, then weekly, then every fortnight, and then stopped altogether, on June 10th, three months after her admis-

sion. Immediately after the first introduction of bougies she began to eat solid foods, cakes, gruel, bread, meat, potatoes, fruit, etc., and there have been no regurgitations whatever since. An examination made of her on September 23, 1892, shows a healthy color in her face, and an increase in weight of eighteen pounds; weighs now fifty-three pounds; her appetite is good and she eats food in quantities; drinks freely and large quantities at a time. Whereas formerly she never left the house alone, she now goes out and acts as other children do. Body well nourished. Fluids held in the mouth enter the stomach in eight seconds.

A feature of this case worthy of passing notice was the attempts of the child to force the food down and make it remain. She lay on her back with her head far extended and would eat and try to swallow in that position.

Stricture of the œsophagus, as a result of swallowing lye and other acrid poisons, is very frequent. The literature of these is abundant: Campbell reports sixteen cases; and the records are full of cases due to carcinoma, inflammatory changes, and syphilis. Congenital cases are very rare. Ziemssen says: "Congenital atresia and partial defects in the œsophagus, since they are incompatible with long life, should not now call for further remark. But, on the other hand, there are stenoses of the œsophagus, although indeed *very rare*, which, from their anatomical structure (a perfectly healthy condition of the tissues and no trace of scars) as well as from their history (the existence of considerable difficulty in swallowing from the earliest childhood and throughout the whole life), must be considered to be congenital, but which, in spite of considerable narrowing of the tube, permit of a prolongation of life even till old age." He divides congenital strictures of the œsophagus into stenosis of the upper portion and of the lower.

Regarding stenosis of the upper portion he says: "There are only two well-authenticated cases of this kind to be found in the literature of this subject, to which we add a third. In all three the stenosis was located at the entrance of the œsophagus, in two it was a simple ring about the tube, in the third the canal was narrowed for a distance of 8 millimetres. In all three the patients declared that they had suffered from earliest childhood with difficulty in swallowing, which was especially troublesome when solid substances were swallowed. All three died at an advanced age, two by exhaustion from lack of nourishment, the difficulty having increased later in life, and the third died of cancer of the pylorus."

The cases quoted are:

(Everbard Home.) Female, aged fifty-nine years; died from exhaustion. Post-mortem showed, immediately behind the first ring of the trachea, a uniform circular contraction formed by the mucous membrane, which presented a perfectly normal and healthy appearance.

(Casan.) Male, aged seventy-seven years; died of exhaustion. Pharynx at lower half was found increased to double its width, and filled with a whitish

pap. Below this was a sudden narrowing in the form of a circular ring, with a puckered edge and a diameter of one millimetre. This led to an equally narrow canal eight millimetres long, in which the mucous membrane lay in longitudinal folds, and which terminated in a funnel-shaped enlargement below. There was not the least change in the mucous membrane at the seat of the narrowing.

(Zenker.) Female, aged sixty-six years, died of cancer of the pylorus. The œsophagus was greatly contracted in its upper portion in a circular form; the mucous membrane was pale, delicate, and unchanged in anatomical character.

Strictures of the lower portion of the œsophagus congenital in origin have been described by Blasius, Cruveilhier, Hilton-Fagge, and Wilks.

In all these cases the stricture affected a small region in the lower part of the tube, and immediately above it the canal had suffered saccular dilatation, in which Cruveilhier found large polypoid vegetations of the mucous membrane, and in Fagge's case an epithelial cancer had perforated the wall.

In Fagge's case, the patient, aged forty-eight years, had difficulty in swallowing for forty years; had to divide food finely. Never regurgitated.

In Wilks' case, the patient died seventy-four years old, of pneumonia. Had difficulty in swallowing and regurgitated food. Had to use quantities of fluid. The stenosed portion would scarcely admit the little finger, while the œsophagus above was enormously distended and hypertrophied.

Koenig says: "As far as congenital strictures are concerned, there is no satisfactory evidence of their existence in the bodies of children. Zenker and Ziemssen have reported three cases, and Blasius and Cruveilhier each one." These do not seem to him to be fully proven to be congenital in origin. He quotes Wernher, who says: "Congenital strictures of a degree sufficient to interfere with deglutition are much more rare than complete occlusions. They are found with a blind pouch or crop-like dilatations of different parts of the œsophagus, occurring oftenest in the upper part." While Koenig is unable to find any literature to support the claims that these contractions and diverticuli are congenital, still he believes that they may occur.

Turner narrates a case of a child, eighteen months old, with symptoms of œsophageal obstruction, who died in a fortnight from inanition and exhaustion. The symptoms whereon the diagnosis was based were, that the child drank ravenously, and after an interval of a half-minute the mouth would be opened in a spasmodic manner, and the greater part of the fluid regurgitated in successive gushes, without retching or exertion except contraction of the abdominal muscles.

Autopsy. Œsophagus at its lower part much dilated, and its muscular coat hypertrophied. Tight stricture at cardiac orifice; a No. 2 catheter passed with difficulty. No appearance of cicatrization.

Crary reports a case, a male aged twenty-five years, admitted to Roosevelt Hospital in September, 1889. Had difficulty in swallowing since birth. Regurgitated as an infant. At the age of twelve he had frequent aggravations of the trouble; could not at such times swallow water, and would have to go to bed until the stricture relaxed. While in France a bougie was passed, but no opinion was expressed. Had recurring attacks, at intervals, of complete stenosis. Food had to be very minutely divided, and often it became neces-

sary for him to leave the table in order to relieve himself of some of the food which he had taken.

Examination revealed malnutrition, and the patient very weak. Stricture suspected, and a No. 20 (French) bougie was passed through the œsophagus into the stomach. The stricture was long, from fourteen to sixteen inches from the teeth, diminishing in calibre as it approached the orifice of the stomach, near which opening it was evidently located.

Bougies were passed tri-weekly for two months, and then passed easily, admitting later an instrument of eight millimetres.

Patient gained in health and strength. There has been no regurgitation since the first bougie was introduced, and with some restrictions he lived comfortably. No specific nor tubercular history. The trouble was probably due to an arrest of development by which the formation of a free communication between the œsophagus and stomach was prevented.

Gerhardt says: "Congenital strictures of the œsophagus are very rare," and mentions those reported in Ziemssen and that of Turner. Ziegler speaks only of those strictures caused by cancer or cicatricial tissue.

Mackenzie says: "Although it is highly probable that the condition is a congenital abnormality, I am not aware that there is any instance on record in which its existence in early life has been proved by post-mortem examination." The diagnosis is not always easy. Hamburger goes extensively into the question of auscultation of the œsophagus, and Mackenzie and Elsberg have also written on that subject. With care, obscure cases can be readily detected by this method.

As to the treatment, dilatation with bougies ranks first. It is necessary to remember, however, that the introduction of bougies must be carefully done, the largest possible size being used to begin with.

A. Jacobi reports a case of stricture of the œsophagus due to swallowing lye, in a child of seventeen months, where attempts had been made to pass œsophageal bougies. There resulted a fistulous tract, commencing in a hole in the mucous membrane and submucous tissue, running along the outer and posterior aspect of the œsophagus to near the neighborhood of the diaphragm, and there perforations had taken place into the right pleural cavity. In the latter place, milk and whiskey were found.

From the foregoing it will be seen how very unusual these congenital strictures are. It is fair to assume that the correctness of the statements of the patients who died as old people, that their trouble dated from infancy, and hence was congenital, may very readily be doubted, although the strictures showed no cicatricial tissue.

Koenig and Mackenzie have, therefore, expressed their doubts.

The cases reported by Turner and Crary, as also the one here reported, demonstrate the fact that congenital stricture of the œsophagus is a condition that may and does exist, and that under careful treatment recovery is possible.

The obstruction in this case was, in all probability, due to a membranous band almost occluding the œsophagus in its lower portion.

NOTE.—The patient has been under observation for one year since the last report of her condition. There has been no return of the re-

gurgitations and she continues to swallow all foods. Has now become a strong and healthy girl, there being a marked contrast to her former appearance. The œsophageal tube, which has been introduced once in every six or eight weeks, is no longer grasped as it readily enters the stomach.

A CASE OF POISONING BY A BELLADONNA PLASTER.

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Miss P., aged about thirty years, a music teacher, was sent me by her physician on account of obscure eye symptoms.

Her complaint was that on rising one morning she found a mist over her vision, and found that she could not read unless she held the book at a good distance. This was on a Monday, but during the week the symptoms were ameliorated by taking a dose of Gregory's mixture. On Sunday, however, they began to return, and by Monday were as bad as ever. On Tuesday she came to consult me. She looked flushed, and her eyes had an unnatural brightness, the pupils were not larger than they often are in those who, like herself, have slight myopia.

What aroused my suspicion was that she was always moving her mouth about in want of saliva, and on inquiry she said that her mouth and throat were painfully dry. Her near point of vision was found to be not nearer than a half-metre, so that, as she had 0.75 D. of myopia, her range of accommodation was only 1.25 D., instead of being, as it should be at her age, 7 D.

Feeling sure that belladonna must be accountable for the symptoms, a searching inquiry was made as to the possibility of her having had it in some prescription or liniment, but all such possibility was denied.

At last she volunteered the confession that she wore a plaster over the lower part of the back, unknown to her physician, and that it was possible this might contain belladonna. Inquiry into her other bodily symptoms placed it so beyond doubt that the suspicion would prove correct that she was simply ordered to remove the plaster and take a purge. This she did, with the result that the symptoms rapidly disappeared, though even eighteen days afterward, when she called again, the near-point had not been quite recovered, and some of the nervous symptoms had not completely disappeared.

The symptoms, which I carefully noted when she first came, were so well marked, and many of them so characteristic, that they are worth recording as a study of the physiological action of belladonna. The dryness of the mouth and throat has already been alluded to; besides this her eyes felt dry, and her skin also. Her pulse was 106, and the apex-beat of the heart very strong and diffused. This is well known to be due to paralysis of the cardio-inhibitory terminations of the vagus. On inquiring about her flushed face, she said she was naturally rather pale, adding: "I never have such a color as I have just now?" Her face felt hot. The eyes appeared smaller (was this due to paralysis of the unstriated muscular fibres of Müller?) and had a piercing look; to relieve their unpleasant dryness she had been obliged to bathe them with milk and water. She says her eyes seemed to have retreated more

into their sockets; this is quite possible, for it is well known that belladonna often relieves exophthalmic goitre, and it may do so by paralyzing the unstriated muscle behind the globe. It is not well, however, to attach too much importance to the observation of a patient on this point, for the mere dilatation of the pupil may deceive him, and make him think the eye looks smaller or more deeply sunk. She had well-marked accommodative micropsia, and complained spontaneously of it, saying, "A sixpence looks like a threepenny piece." Her color sensations had an abnormal permanency, so that if she looked at anything red or blue, the next object she looked at appeared to be of the same color. This is an interesting phenomenon because it is sometimes met with in individuals otherwise normal. I have met with one very well-marked case of such abnormal persistency of color sensation. It appears to be one form of hyperæsthesia of the retina, unless, indeed, its seat be in the nervous centres. Closely allied to this are the mental hallucinations so characteristic of belladonna. One night she called her sister's attention to a light shining in at the window, but her sister could see nothing. At other times she thought she saw dark objects. There was hyperæsthesia also of the other senses, so that any disagreeable odor appeared far worse than usual, and noises were unbearable. This keenness of sensation perhaps accounted for the fact that she could not sleep well, but kept waking up every hour. Her natural "nervousness" had been greatly increased by the belladonna; she had become "dull and desponding," life seeming miserable to her during the night; there was also loss of self-confidence, and a feeling as if it were not safe to venture out into the streets alone; she became taciturn, and yet irritable with her pupils; could not remember the day of the week, thinking, for instance, on Wednesday that the day before was Sunday. She would cross the street rather than meet with her friends, from a sense of timidity. Her locomotor equilibration seemed affected, for on rising in the morning she felt giddy and disconcerted on putting her feet on the floor—feet and limbs not seeming to move as they used to; "less agility in movement," and, on walking, felt as if her foot needed putting down a second time. These symptoms are interesting as being distantly related to some of those in locomotor ataxia, being, however, functional instead of organic.

The bladder symptoms were almost pathognomonic of belladonna poisoning, and are of interest in connection with the undoubted service of this drug in the enuresis of children. She had frequent desire for micturition, having to rise three or four times at night and passing much more than usual, very pale, and occupying a long time in its evacuation by a thin stream, with complete intermissions as though micturition were over, then beginning again. This probably points to the muscular fibre of the "detrusor urinæ" being semi-paralyzed. The copious flow of pale urine, reminding us of hysteria and of those nervous headaches which are associated with the same hyperæsthesia of the senses, is no doubt nervous in its origin, unless, indeed, it be, as Dr. Haig would have us suppose, a question of the action of belladonna on the vital chemistry of uric acid.

In conclusion, it may be said that the plaster was found to be made by one of those firms who pride themselves on the excellency of their belladonna plasters, and who exhibit the results of tests to show how

much more belladonna they contain than the officinal plasters. The case recorded shows there is a limit to excellency of this kind, and that there is need for caution not to carry it too far.

THE OCCURRENCE OF HEMORRHAGE AFTER OPERATION FOR THE REMOVAL OF ADENOID TISSUE FROM THE NASO-PHARYNGEAL VAULT: WITH THE REPORT OF A FATAL CASE.

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OF all the operative procedures done in our work, no one is probably more frequently undertaken than that for the removal of adenoid tissue from the naso-pharyngeal vault. It is performed so often that we are apt to look upon it as a minor affair in execution, however much we may laud its therapeutic value. An unfortunate experience occurring in my own work some time ago, and that, too, under somewhat unusual circumstances, is my excuse for again bringing this matter forward.

The possible complications after this operation may be grouped as follows:

1. A bronchitis may arise from the escape of blood into the lower air-tract.
2. An infectious element may be introduced, leading to septic mischief.
3. Inflammation of the middle ear may result.
4. There may be hemorrhage, primary or secondary.

The first of these may be dismissed as very unlikely to occur if proper precautions are taken. The blood quickly clots, and not coming from an arterial source is devoid of any propulsive force. What seems to go down the throat glides down into the œsophagus and stomach. The coughing is from the reflex irritation of the lower pharynx and does not signify a filling of the air-tubes. In one case (Delavan), a clot fell on the larynx and obstructed the glottis, but it was expelled without doing any damage.

Another case will doubtless be recalled to mind—that also reported by Hooper, where a digital examination in a hæmophilic subject caused a fatal hemorrhage.

Relative to the second heading, two cases of traumatic fever have been reported by Moldenhauer, one case of facial erysipelas by C. Michel, and one by Wendt; also a case of mild angina with cervical adenitis by Cartaz. Cases of middle-ear trouble are not rare, though in my own work, running back about five years, I have met with only one such.

This was a mild case and subsided without suppuration. In no instance, previous to the present one, have I ever seen an amount of bleeding sufficient to cause the slightest anxiety.

The history of the case forming the basis of this paper is as follows:

A boy, aged three years and nine months, of Irish parentage, was first seen by me in March, 1892. He was anæmic and of a somewhat general strumous appearance. He had a bronchial catarrh of the larger tubes which had lasted for several weeks. Simple measures relieved the latter, but the anæmia continued, in spite of tonic treatment carried on for some time. Inquiry into the condition of his various bodily functions pointed unmistakably to the existence of adenoid vegetations in the naso-pharynx. This suspicion was confirmed by a digital exploration. Removal of the tissue was advised and agreed to by the mother. An appointment for the operation was made for April 26, 1892, at the Roosevelt Out-patient (Throat) Department—in the service of Dr. Jonathan Wright.

The family history of the patient was negative. Not the slightest evidence of hæmophilia could be obtained on the side of either parent. The child had no unusual nose or throat lesions. He lived in a tenement and presented the usual characteristics of the class. He was of normal size and weight.

The rules governing these operations which are in force at the Roosevelt Hospital are as follows: The hour chosen is 2 P.M. The mother is cautioned to give the child a fluid or semifluid breakfast and nothing but water for at least four hours before the anæsthetic is given. A dental chair is generally used with its back depressed so that the patient lies supine, with the shoulders slightly elevated. The anæsthetic used is ether, carried only to the primary degree. The instruments employed are the O'Dwyer gag, the various modifications of the Löwenberg and Gradle forceps, and Gottstein's curette, as may be best suited to each individual case. No subsequent topical treatment is employed. After the operation the patient is rolled on the side and the head allowed to fall back over the edge of the chair, being supported in that position by the hand. A close watch is kept till bleeding ceases and consciousness is fully restored. The patient is allowed to lie quietly for an hour or more under the supervision of the mother, who is then instructed to carry it home, keep it quiet in bed for twenty-four hours, and on a light diet. Unless she lives within calling distance of some one of the clinical staff, who may be summoned in case of an emergency, it is insisted that the patient be left in the children's ward of the hospital over night. Unwillingness to comply with this condition is met with a refusal to operate.

In accordance with these rules the operation was done on the date given above, the case having been assigned to me by Dr. Wright. Ether was skilfully administered by Dr. Sherman, of the clinical staff, and taken very kindly by the patient. A Gradle forceps with scissors handle (Nichols' modification), and a Gottstein's curette were employed. A fair amount of tissue was removed. The bleeding was rather free for a minute or two, but quickly ceased. Restoration to consciousness was speedy. On leaving the hospital, two hours after the operation (4 P.M.), the child was bright and apparently doing well in every way. The mother was instructed to send for me if necessary, as I happened to live nearer than any other member of the staff.

The history of the next fourteen hours was obtained from her. At six o'clock (four hours after the operation) the child began to have a "rattling" in its throat (mother's statement), and slight bleeding from the anterior nares. The latter soon ceased, but the "rattling" continued with increasing severity. The mother decided to send for me, but was, in some unaccountable way, dissuaded by her neighbors from so doing. They told her that "the child was all right," "was in no danger," "children always acted that way after operations," etc., and so lulled her into a false sense of security. Meanwhile the oozing hemorrhage went steadily, though slowly on. At six the next morning (sixteen hours after the operation) I was sent for, as it was evident to all in attendance that matters were becoming desperate. I reached the house at 6.30. The picture upon entering the room was that of an exsanguinated child lying on a pillow in an arm-chair. It was perfectly conscious and swallowed some brandy and water without the slightest difficulty. The skin was cold and slightly moist. The breathing was rapid and shallow, with loud tracheal râles. The heart action was frequent and feeble. Percussion detected dullness all over the chest posteriorly, most pronounced over the lower lobes. By palpation it was very evident that bronchial fremitus was much more pronounced behind than in front. Nothing had been given in the way of medicine. The child had simply been left to bleed.

The administration of brandy and water was continued with, for a moment or two, apparently promising results, and the child wrapped in warm blankets. In order to work with greater ease, it was lifted, still in the recumbent position, to the sofa. Scarcely was this done, however, when it gave a slight gasp, a general muscular shudder, and stopped breathing, and in a minute or more heart action also ceased.

It is useless to speculate as to whether the bleeding could or could not have been checked had medical aid been earlier summoned. Judging from the experience of others, it is not illogical to reply in the affirmative. Proper tamponing would probably have averted the unfortunate result. There was in my own mind no doubt as to the cause of death. The picture was a typical one of exhaustion from a slowly progressing hemorrhage. Every precaution was taken to provide for emergencies, and no fault of management, it is honestly claimed, could attach to the operator.

The error, if one existed, was an error of judgment as to the advisability of operation. Did the child's previous general condition contraindicate operative interference? Delavan, in a paper read before the last meeting of the American Laryngological Association,¹ discusses the influence of certain diathetic conditions upon the prognosis in operations upon the throat, especially the hemorrhagic, rheumatic, and strumous, as well also of exophthalmic goitre and general lymphadenoma. All of these could be excluded in this case, except, perhaps, the strumous. Though there were no pronounced manifestations of the latter, yet we all

¹ See Transactions American Laryngological Association for 1892, and New York Medical Journal, November 19, 1892.

recognize the possible existence of minor grades of this factor in all tenement children. The therapeutic needs, suggested by the child's condition, were carefully noted, and improvement resulted up to a certain point. The amount of adenoid tissue existing was, in the operator's opinion, sufficient to account for the stationary condition by reason of imperfect oxidation of the blood, and consequent lowered vitality. Its removal was therefore indicated.

What are the general causes of hemorrhage in the non-hæmophilic and non-diathetic cases? Cartaz (*Revue de Laryngol.*, 1890, No. 13) enumerates them as follows:

1. Hemorrhage has occurred more frequently where no anæsthetic has been used.

2. We may directly injure a large bloodvessel.

3. We may tear off a piece of healthy pharyngeal mucous membrane. Where no anæsthetic is used, the reflex palatal movements are not restrained. Palatal contractions so narrow the palato-pharyngeal space that a bit of mucous membrane is seized. The advocates of the curette claim that this does not ever happen with this instrument.

4. Hemorrhage is apt to occur in females past the menopause, if the operation is coincident with the menstrual epoch (a point with reference to which we do not often, I fancy, make inquiry).

5. Hemorrhage may occur if there has been a recent inflammation of the back part of the throat.

6. It may occur if the masses to be removed have a fibroid consistency.

As one looks over the various text-books, the subject of hemorrhage after the operation is very briefly alluded to. The general impression seems to be that its occurrence is very unlikely. Yet, if the truth were fully known, it would probably be found that cases requiring tamponing are, among the older patients at least, by no means rare. Morell Mackenzie is on record as never having seen a case in which bleeding could not be checked by the insufflation of tannin or matico powder. Max Schaeffer (*Berlin klin. Woch.*, July 15, 1891) has operated one thousand times without any severe hemorrhage. In the discussion following the latter's paper, Lange, of Copenhagen, reported seven hundred cases, with only one severe hemorrhage. Another participant in the discussion had had two cases, number of operations not given. Löwenberg¹ has always found alum sufficient to check any bleeding he has met with. There are so many loose statements on this point that it is difficult to get at the exact facts.

Authentic cases of hemorrhage have been reported by Delavan² and Cartaz,³ and, as this paper was in preparation, by Rousseau,⁴ of Brussels.

¹ Les Tumeurs adenoïdes de Naso-Phar., Paris, 1879.

² New York Medical Journal, Oct. 12, 1889.

³ Loc. cit.

⁴ Revue Internat. de Rhinologie, May, 1892.

In a recent paper read before the French Congress of Laryngology, he enumerated sixteen cases from various sources. None of the cases proved fatal. An effort to tabulate them is difficult, because the data are in many instances wanting.

Making the best analysis possible, it is seen that out of eleven cases in which the age is given, four occurred in the first decade of life and five in the second. The youngest age recorded is four years (Delavan), while the oldest is twenty-eight (Ruault). In one instance (Capart) it is stated that the patient was an adult. The use of an anæsthetic is recorded only three times, chloroform once, ether once, and cocaine 5 per cent. once. The list of instruments as given includes the curette, finger, and various cutting forceps. The time after operation at which bleeding commenced varied from immediately to twenty hours. Tamponing seemed to be the favorite measure of relief employed, though in one case (Ruault) it could not be borne, and hemorrhage ceased upon the supervention of syncope. In another case (Cartaz) the occurrence of uterine colic, coincident with the accident in the naso-pharynx, suggested the onset of the menstrual epoch, and revulsive measures established the uterine flow, coincidently checking the hemorrhage in the throat. The accident in this case occurred only after the third operation for the removal of the offending tissue. In one case (Segond) bleeding stopped of its own accord, but returned on the eighth day. In several it was so severe as to cause syncope. In the paper by Delavan (see above) there is a record of a fatal case in a child aged four, and a third fatal case recorded, occurring in his own practice. The latter patient was a boy aged two and a half years. The operation was done under ether with Löwenberg's forceps and the finger-nail. Hemorrhage occurred eight hours later and death in about twenty-four hours.

It is hardly probable that the mere size alone of the mass removed is a factor in bleeding.

Wright has reported the case of a young woman operated on under the most favorable circumstances in whom post-nasal tamponing with cotton dipped in iron nitrate solution was necessary, yet he had previously removed from the same patient larger pieces of tissue without any hemorrhage whatever. The explanation of this, and similar cases, may lie in the fact that the deeper we go from the surface of the lymphoid mass the more vascular the parts naturally become. Our first cut, embracing the more superficial portions, causes slight bleeding only. The deeper ones are more apt to bleed. The limitation to this view would be the fibroid consistency of the growth, as with the soft material we would endeavor to remove it all with one application of the cutting edge.

It is natural to ask if the position of the patient during operation is a factor in causing the danger we are discussing.

Lockhart Gibson prefers a steel finger-nail in operating, of such a shape that it is curved over so as to bring the plane of the cutting-edge parallel to the top of the pharyngeal vault. He regards bleeding as occurring so frequently that it is hardly safe to operate with the patient in the usual position for chloroform administration. He advocates what he calls Rose's position, which we more commonly know as Howard's. The patient lies supine with his head hanging so far backward over the edge of the table that the line of the face is almost vertical. The head is supported in that position either by the hand or by a projecting shelf. He uses a rhinoscopic mirror, an assistant pulling forward the palate. The blood comes through the dependent nostrils, and a good opportunity is allowed for subsequent irrigation before recovery from the anæsthetic.

It has been pointed out by several observers how too long a continuance in this position might interfere with respiration and by obstructing the cervical veins cause a venous congestion which would predispose to the very accident it was intended to prevent. It seems to the writer that it is safer to operate in the usual position for general anæsthesia (excluding those cases of course where cocaine is used). After the operation is concluded there is a brief space of time before the return of consciousness, during which the head can be placed so as to let the blood flow through the nostrils and allow of subsequent irrigation if the latter is desired. One point in technique seems to be worthy of note. Wroblewski¹ cleanses the cavity with a piece of iodoform gauze placed over the finger-tip. He wipes the vault out with gentle force, regarding a smooth surface as a condition greatly to be desired. No tags of tissue ought to be left.

Moreover, it is not the writer's opinion that the nature of the instruments used enters into the question of bleeding, granting that all are used with equal skill. Hemorrhage has followed the use of the bare finger, the steel nail, various forceps, and the curette. Undoubtedly some instruments are, in unskilful hands, more liable to do damage than others.

One single case proves very little either way. Yet such an experience as the one narrated proves that we cannot be too careful in our simplest procedures. Patients from whom adenoid tissue is removed ought to be kept under careful observation for at least twenty-four hours. No single instrument is the ideal one for every case. Unless one single application of the curette will suffice to clean out the pharyngeal vault the writer inclines to the use of an anæsthetic. He prefers ether carried to the primary degree, and the forceps, either the Gradle instrument or a modification thereof, and supplemented frequently by the use of the curette and finger-nail.

¹ Revue de Laryngol., 1892, No. 9.

COMPLETE PROLAPSE OF THE RECTUM; AMPUTATION.

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THE patient was a single woman, aged twenty-five years. She had suffered for many years from a prolapse of the rectum, for which no treatment had been of any avail.

It was decided to perform the operation of removing elliptical portions of the mucous membrane, and thus narrowing the orifice. After the operation, as long as the patient remained recumbent, the bowel retained its position, but on her getting about, the prolapse recurred and became as bad as before.

Three months after this operation a second attempt was made. It consisted in excising on each side a considerable portion of the distended external sphincter and bringing the free edges together. But, as before, when the patient began to get up again, the prolapse recurred.

Encouraged by the perusal of a successful case of excision of a prolapse of the rectum by Treves,¹ I decided to advise the patient to submit to a third operation, to which she consented.

Under an anæsthetic, the patient was placed in the lithotomy position, with the pelvis well raised, to avoid, if possible, any prolapse of small intestine into the peritoneal pouch, which it was expected to encounter.

The prolapsed rectum having been drawn well down, a transverse incision was made in front of the prolapse at the junction of skin and mucous membrane. On deepening this incision a pouch of the peritoneum was opened, and the extreme lateral boundary of this to the patient's left (and operator's right) was sought. Both the parietal and the visceral layer of the peritoneum (on the rectum) were divided in stages from left to right, the two layers sewn together, and in this way the abdominal cavity was shut off. Nothing was seen of the small intestine.

The amputation of the prolapsed rectum, flush with the surface, was then completed; bleeding-points were secured and the mucous membrane was sewn to the skin all around. The amputated portion contained the greatly dilated sphincter and eight square inches of peritoneum, a prolongation of Douglas's pouch.

The patient made a satisfactory recovery. She was last seen fourteen months after the operation. She was then quite well and could walk several miles. There was no prolapse, no incontinence of feces, and no contraction of the orifice. The line of junction of the skin and mucous membrane had retreated somewhat upward, and at that level a band could be felt, suggestive of an internal sphincter, but it probably consisted only of connective tissue.

Cases of prolapse of the rectum treated by amputation will be found recorded by Partridge in the *Indian Annals of Medical Science*, 1871, No. 27; by Raye (at Calcutta), in the *Lancet*, July, 1886, and by Treves, in the *Lancet*, February, 1890.

¹ *Lancet*, February, 1890.

REVIEWS.

PHYSICAL DIAGNOSIS. A GUIDE TO METHODS OF CLINICAL INVESTIGATION. By G. A. GIBSON, M.D., D.Sc., F.R.C.P.Ed., and WILLIAM RUSSELL, M.D., F.R.C.P.Ed., both Assistant Physicians to the Royal Infirmary and Lecturers in the Edinburgh Medical School. Second edition, revised and enlarged. With one hundred and nine illustrations. Pp. 383. Edinburgh and London: Young J. Pentland, 1893.

A WORK of this size which attempts to include so much is always open to criticism, in that no two would agree as to what should properly be omitted. What the writer deemed important enough to merit attention may seem to another as of too little moment to deserve consideration, and the omission which to the writer was a virtue may be magnified into an unpardonable sin when viewed through the lens of the critical reviewer. The faults with this work seem more faults of judgment than in statement of facts.

Brief introductory chapters on Methods and Terms, and Temperature open the book. We judge that the use of the binaural stethoscope is not advised. In the chapter on Temperature, "febricula," ushered in by slight rigor and rise in temperature of several degrees, is spoken of as frequently occurring in women a few days after delivery. In the accompanying chart the temperature is represented on the third and fourth days after delivery as between 103° and 104° , dropping two days later to normal. We confess that with us a "febricula" of this character in the lying-in woman is always a cause of more anxiety than it seems to be to our authors. With the treatment of the puerperal woman now in vogue, such rises in temperature should not be so common that it may be said they "frequently occur," and when they do, sepsis of some form is to be suspected.

A superficiality in treatment of some of the topics, an inevitable result of the attempt to put so much in so small a space, is noticeable, more, perhaps, in the chapter on the Integumentary System than elsewhere. It would have been wise to have utilized the twenty-six pages devoted to the skin, in considering skin lesions merely in the light of indices of disease, rather than to attempt to cover in so few words the diagnosis of the many diseases peculiar to dermatology. The help gained by the student in perusing these pages will, we fear, be very slight. Confusion will more than likely result. The mere mention of the category of skin diseases, with a brief word as to each, does not add to the value of the book. No student could, with the aid derived from this chapter, make a positive diagnosis of a single disease of the skin.

In the chapter on the Circulatory System the authors seem more at home. There is less indefinite generalization here, and the chapter, as a whole, is excellent. We would note as worthy of special commendation

tion the figures illustrating, diagrammatically, the variations in the heart sounds, the time and mechanism of endocardial murmurs and the area of the chest wall over which each murmur is best heard. There is nothing in the whole subject of physical diagnosis simpler than the rudiments of cardiac auscultation, at least theoretically—and yet there is nothing more difficult for the student to grasp than these fundamental facts concerning normal and abnormal heart sounds. The figures here employed, many of them original, will certainly do much to prevent confusion in the mind of the student and give him an early, clear conception of this important subject. The pulse, too, is fully treated of, including the use of the sphygmograph. While considerable space is devoted to this instrument, and numerous pulse-tracings are portrayed, there is no false impression left as to its value. "It must be borne in mind that the sphygmograph is of limited use in diagnosis" (p. 98). The five pages devoted to the examination of the blood contain very brief and somewhat incomplete directions for the use of Gowers' hæmometer, the Thoma-Zeiss instrument, and Gowers' hæmoglobinometer, and that is about all. No mention is made of Fleischl's hæmometer, of any method of determining the specific gravity of the blood or of examining stained preparations after Ehrlich's method. The subject of the blood is not treated in a very satisfactory manner. It is better to omit entirely the consideration of such a subject than to give a mere smattering knowledge of it.

The chapter on the Respiratory System is in most respects praiseworthy. There is shown here intimate practical acquaintance with pulmonary diseases, and also an experience in teaching students concerning these diseases. The explanations of physical signs are clearly given, the acoustic principle involved and the pathological anatomy of the condition in question being plainly set forth, so that the reason *why* a certain sign is present is brought prominently forward. The diagrams here, as in the case of the circulatory system, are of genuine value to the student. The force of the plea for uniformity of nomenclature will be appreciated by teachers, though the undergraduate may not realize its full import until his reading has become more extensive. The need of some common system of nomenclature in diseases of the chest is evident when we compare our authors' terms with those of Flint, for instance. Flint's adventitious sounds are spoken of as "accompaniments," and of these there are four varieties: (1) rhonchi, sibilant or sonorous; (2) crepitations, "sounds which resemble those produced when salt is thrown into the fire." "They are produced in the bronchi, in the alveoli, and in pulmonary cavities." (3) friction; (4) additional sounds, metallic tinkling, the bell sound, and the succussion sound. The sounds heard and described by Flint and our authors are the same. But the adoption of a different system of classification, and the employment of different terms, make more or less confusion for the reader, and especially for the student who lacks practical experience. We fully agree with what is said as to the great value of the *sense of resistance* upon percussion. Impossible accurately to describe, and only of worth after much practice, it finally becomes to the diagnostician one of his most trustworthy aids. Attention is rightly called to the fact that pleurisy is often primarily diaphragmatic and beyond the reach of auscultation. The importance of familiarizing oneself with the normal sounds over the extreme bases of the lungs, in order that slight amounts of fluids may be here detected, is

urgently insisted upon. Few works, this included, lay the stress they should upon exploratory puncture as a safe, scientific, and, in cases, indispensable method of physical diagnosis. Many a doubtful diagnosis would be cleared up and many a wrong one set right, were the aspirating needle more often used for diagnostic purposes. Brief directions for staining tubercle bacilli are given, but it is assumed that the student knows the formulæ of Heneage Gibbes' and the Ziehl-Neelsen's stains. If the student knows these formulæ he probably knows the method of staining and will not find it necessary to consult this book.

The chapter on the Alimentary System, while containing many excellences, is unsatisfactory, because unfinished in details. The methods of diagnosing a dilated stomach are very imperfectly given. To teach that "evidence of dilatation of the stomach is obtained by producing a splashing sound in it" (p. 197), is to teach what is but partially true. Many patients with normal stomachs can, at times, voluntarily produce a succussion sound. To speak of the examination of stomach contents and omit even to mention Ewald's test-breakfast is certainly unpardonable. The few words concerning inflammations of the cæcum and appendix are scarcely in touch with the later ideas concerning appendicitis and its consequences.

The chapter on the Urine contains quite detailed descriptions of the methods of urinary examinations. The figures illustrating the text are good. We are pleased to see the simple and valuable ureometer of Doremus and Thursfield described by text and figure. It would seem as though our authors have shown a little unjust discrimination against tube-casts when they allotted them only sixteen lines of text and gave to urea, uric acid and urates sixteen pages. Certainly a more fair distribution of space might have been made.

So, too, in the chapter on the Nervous System we find the same disproportionate assignment of space. Out of fifty-five pages devoted to the nervous system, twenty-four, nearly one-half the entire number, are taken up with the consideration of the eye, errors of refraction, etc. Important as these facts in ophthalmology may be to the general practitioner, and valuable as the examination of the eye is to a complete diagnosis of many diseases of the nervous system, too much space is taken up, at least comparatively, with matter worthless to the oculist and of less value to the general practitioner or neurologist than other matters omitted. And this is doubly true when we turn a few pages farther and find much already said concerning the eye practically repeated in the chapter—Examination of the Eye, Ear, Larynx, and Naso-pharynx.

In conclusion we may say that while the book abounds in evidence of the diagnostic acumen of the authors, and of their practical experience as teachers, while it contains many admirable hints here and there as to some little detail of diagnosis valuable alike to student and practitioner, it is, as a whole, faulty in that while attempting to crowd much into a small compass our authors lack terseness and perspicuity; too often where detailed description is demanded they generalize, and *vice versa*; there is a very unfair assignment of space and marked inequality in the treatment of topics.

With liberal excision and addition the book could be made of value.

J. B. H.

BRAIN SURGERY. By M. ALLEN STARR, M.D., Ph.D. 8vo., pp. xii., 295. New York: Wm. Wood & Co., 1893.

PERHAPS no book published of late shows more the overlapping of the different departments of medicine than the present volume, even by its title. *Brain Surgery* is not written by a surgeon, but by a neurologist. In spite of the fact, however, that the book is a capital one and the subject well treated, yet we must confess we regret that a surgeon was not associated with Dr. Starr in its production, as in that case some of the surgical portions would have been more completely treated and a number of small errors avoided. For instance, the whole topic of thrombosis of the lateral sinus and other lesions following middle-ear disease (with the exception of abscess) is dismissed in five lines, of which two consist of a reference to Ballance's well-known article. Surely any work on brain surgery at the present day which omits the consideration of this important topic is in so far imperfect. So, too, the whole consideration of headache and meningitis, which covers less than a page, would have been more elaborated. And a surgeon would scarcely have suggested (page 18) that the fissure of Rolando should be "marked upon the skull by the sharp point of a scalpel, so that, when the bone is laid bare, surface landmarks will still be kept in view," for the sharp point of the scalpel would simply be broken, and the skull would not be marked. Either an awl or a gouge, as suggested on page 278, or the centre-pin of a trephine, is the proper instrument for such a purpose.

We are glad to see that the author has made this essentially an American book. There are few things more noticeable within the last few years than the tendency in this country to write text-books, monographs, and treatises distinctively American in their origin, with knowledge and experience drawn largely from this side of the Atlantic rather than from the other. This is a natural result of our larger, wider experience, of the constantly enlarging numbers of scientific writers, and of the growth in this country of a class of teachers who, like Dr. Starr, can speak *ex cathedra*.

The book consists of ten chapters, in which are first considered the diagnosis of cerebral disease, and then trephining for various conditions, such as epilepsy, imbecility due to microcephalus, cerebral hemorrhage, abscess, tumor, hydrocephalus, insanity, and headache, and terminates with a distinctly surgical chapter on Technique. The chapter on Diagnosis is an excellent *résumé* of the whole topic, is up to date, and will be found very interesting reading by the general practitioner.

That on Epilepsy is the most elaborate, covering about one-third of the entire book. We are inclined to think that the author is a little too sanguine as to the success of the surgical treatment of epilepsy. Of the 13 personal cases reported, Dr. Starr classes 3 as cured, 5 improved, 4 not improved, and 1 death. In reviewing the cases, however, it is clear that two died, and we do not think that any one of the eleven who recovered can be classed strictly as "cured." Most of them were done in 1892, and the latest report on the cases is in March, 1893, too short a time to judge of the final result. That cases of epilepsy are cured by trephining there is no question, especially cases resulting from

traumatism; but there are not a very large number of them. A much larger number have been greatly improved, and in this frequent improvement and occasional cure is found the justification of their surgical treatment. Until we can show a number of cases cured for at least three years, we do not think that a definite conclusion can be drawn in this matter.

In considering the question of trephining for imbecility due to microcephalus, porencephalus, and allied conditions, Dr. Starr is wisely conservative, stating that undoubtedly there are a few cases in which markedly good results follow, but in the majority of cases not much can be hoped for, though these cases are so deplorable that any improvement, even at a greater risk than trephining presents, would be welcome. The author makes the suggestion in this chapter (page 135) that, before opening the dura, the surgeon, by manipulation or by a hypodermatic needle, should ascertain if possible whether the brain is porencephalic or not, and if so, that he should avoid opening the dura. Yet we must also remember that Kocher (*Deut. Zeitschr. f. Chir.*, Bd. xxxvi. p. 72) has reported two cases of such porencephalic dilatation of the lateral ventricles that the choroid plexus and the corpus striatum were seen at the operation, yet they were drained for over three months and finally recovered.

The chapters on Cerebral Hemorrhage, and on Abscess and Tumor of the Brain, are excellent, and there is nothing except praise to be said of them.

In Chapter VII., Trephining for Hydrocephalus, the writer advocates trephining in every case, since, if the disease is primary, it may be cured; and if it is secondary to some other incurable affection the patient will die, and the operation will not necessarily hasten the fatal termination. We confess that this is rather more sweeping than we should advocate. The cases in which we have deemed it right to operate are comparatively few.

The chapter on Trephining for Insanity is very judicious.

The book, as a whole, is most creditable to American medicine, whether regarded from a neurological or a surgical standpoint, and we can commend it very strongly, especially as it will assist in diffusing among the profession at large a knowledge of cerebral localization and of the possibilities which cerebral surgery offers, either of alleviation or of cure.

W. W. K.

LEÇONS DE THÉRAPEUTIQUE. Par GEORGES HAYEM, Professeur de Thérapeutique et de Matière Médicale à la Faculté de Médecine de Paris, Médecin de l'Hôpital Saint-Antoine, Membre de l'Académie de Médecine. LES MÉDICATIONS. Quatrième et dernière série. Pp. iv., 806. Paris: G. Masson, 1893.

LECTURES ON THERAPEUTICS. By GEORGES HAYEM, Professor, etc.

This volume concludes the series devoted to therapeutics. Commencing with the treatment of Dyspepsia, we find six hundred and forty-four pages assigned to this subject, which is presented not as is usual in a work on therapeutics—as a discussion of methods and means of treatment—but

it is as well a treatise on dyspepsia, its diagnosis, pathology, and clinical history. Hayem believes that the chemical examination of the contents of the stomach is comparable to auscultation and percussion, and its practice superior in that it does not admit of personal error, is mathematically exact and leaves little to the exercise of the senses. We submit, however, that since about three hours are required for a complete chemical analysis, the author fails to show that it presents the same range of adaptability to the practitioner as does the physical diagnosis of other physiological systems, although we most heartily indorse his plea for greater accuracy in the diagnosis of diseases of this most important system, the digestive. In his historical retrospect he is just to his predecessors, and in the wealth of literature his task is by no means an easy one. In making a chemical examination of the contents of the stomach he prefers Ewald's test-meal, with removal of contents by siphonage with Faucher or Debove tube. His method is that of C. Schmidt as modified by Winter. Estimations of chlorine are made as (1) free hydrochloric acid, (2) in organic combination, (3) in inorganic combination (fixed). Examinations are also made (1) for organic acids—lactic, acetic, and fatty—(2) for products of digestion—albuminous, amylaceous—(3) as regards pepsin ferment, (4) chemical power (Günzberg's test), absorption power, motor power, (a) salol, (b) oil. As for the tests under the last section, we would call attention to the work of Gley and of Cornet, which throw some doubt on the value of salol in diagnosis, and that the rhubarb test of Brunton is omitted. The presentation of modern physical diagnosis in dyspepsia is masterly, and deserves most careful study. He combats Ewald's dictum, that "free hydrochloric acid is the thermometer of the functional activity of the stomach," and takes into consideration pepsin as well, in building up his classification. With frequent charts, tables, and formulæ, this part of the subject is made clear and easy of comprehension. His symptomatology is cleanly cut, and in conciseness is worthy of our best old authors. He criticises Reichmann's gastro-succorrhœa, classifying the cases of dilatation without, however, underestimating the importance of this condition. He shows that gastralgia is often due to free hydrochloric acid, discusses flatulence, buccal dyspepsia, which excited so much interest a short time since, divides intestinal dyspepsia into cases dependent upon suppression or changes in (1) bile, (2) pancreatic fluid, and (3) intestinal fluids, treats of constipation, diarrhœa, enteroptosis, presents the accessory symptoms as shown in the eyes, ears, the migraines, somnolence, coma, tetany, disturbances of general nutrition, and closes with the urinology. He takes up the pathology, not omitting the rôle of the microbes, and endeavors to place the pathological anatomy as a basis for his symptomatology.

In taking up the subject of treatment, he begins with the hygiene. Taking Bauer's definition of digestibility or "the resistance of aliment toward digestive fluids," he gives milk a prominent place, as sedative, easy and rapid of digestion, and fixes its value by careful clinical observation supplemented by chemical tests. He gives the indications for the use of kumyss and kephir, but omits to mention matzoon, which is often preferred by patients to the more widely known kumyss. He has made a thorough study of the use of meats and vegetables, and shows his thorough disapproval of pastry by quoting Fonsagrives, "*Les pâtisseries sont les officines de la dyspepsie.*" He gives rules and their application for the choice of diet, and presents the various "cures"

and methods, not even omitting Weir-Mitchell. On the subject of drugs he is not an enthusiastic advocate of massive doses of alkalies, but—the indications, based on careful physical examination, having been determined—he makes full use of them. The proper use of acids, bitters, including condurango, strychnine, the inhalation of oxygen, the caution as to the digestion of iron, are clearly and concisely presented. In the work upon digestive ferments he speaks of the French pepsins, with, perhaps, pardonable patriotism, as in general the best, but shows that they should be administered not with, but at a separate time from hydrochloric acid. We feel that he has not given sufficient attention to pancreatin, apparently believing that most digestive disturbances have their point of origin in the stomach. His presentation of papain is excellent, but we had reason to expect that he would have included the recent literature of the other digestive ferments of vegetable origin, notably those of the pineapple family (*Bromeliaceæ*). On the subject of disinfectants he states their advantages and their limitations as well, but clearly demonstrates their usefulness. Resorcin is omitted, which, perhaps, is pardonable, as its really scientific literature is quite recent. The literature of purgatives is excellent, although in minor points some would join issue—that their action depends so largely upon increased peristalsis preventing resorption of intestinal fluids, that concentration of solutions of sulphate of soda makes no difference in their action, and that hourly doses of calomel of from one to three and one-half grains should be considered fractional. Cascarin as an active ingredient of the valuable cascara-sagrada is omitted, and the use of the so called concentrated glycerin-sulphate of magnesia enema should have been mentioned at the same time as glycerin suppositories. In the use of lavage he does not recognize the dangers that have been pointed out by Fenwick. In other respects the section is complete. Massage receives due attention, and the subject of electricity, the various methods and forms, is carefully summed up in tabular form. The indications for the use of mineral waters are fairly given, and are based upon clinical observation. From pages 597 to 644 is found the synthesis of this portion of the work, giving in detail special indications for the treatment of each condition under the heading of dyspepsia. The work of Dujardin-Beaumetz, with which as a student in Paris we were familiar, marked an era in the development of the diagnosis and treatment of the diseases of digestion; the brilliant work of Éwald and his *confrères* was a decided advance. To-day this work on dyspepsia stands easily without equal in broad scientific spirit, careful literary criticism, and practical teaching for the physicien.

The treatment of the symptoms of dyspnoea is covered in thirty-seven pages; the usual remedies, ether, chloroform, grindelia, pyridine, quebracho, lobelia, euphorbia, nitrites, and arsenic are considered. The remedies useful in relieving cough and expectoration are dismissed in twenty-nine pages—too briefly, we believe; although nothing new is presented, yet it is a fair presentation of the subject when it is taken into consideration that some of these remedies have been discussed in other lectures. In the forty-nine pages upon albuminuria we find many practical points, without, however, a large array of remedies; uræmia, in nine pages, receives careful attention for its special forms. The anhydrotics do not include any new substances, unless camphoric acid and tellurate of soda be so regarded, and yet in the eight pages we expected to find the old remedy, oxide of zinc.

Taken as a whole, this volume is eminently practical. Written in the form of lectures, it is very readable, the ancient history of therapeutics is briefly given, and authors are duly credited for their work, and their opinions fairly stated even when disagreed with. The work is modern, but few valuable methods or drugs are omitted, the material is well digested, and the treatment advised has for its basis physiology and careful physical examination. The general trend is not optimistic, but on the other hand the author has no sympathy with therapeutic nihilism. This fourth part amply fulfils the promises of its predecessors and is a credit to the vigorous, practical French school of medicine.

R. W. W.

FERMENTATION, INFECTION, AND IMMUNITY. A NEW THEORY OF THESE PROCESSES. By J. W. McLAUGHLIN, M.D. Austin, Texas: Eugene Von Boeckmann, 1892.

In the preface to this work the author states that, "While much valuable information has been acquired concerning fermentation, infection, and immunity, and various theories have been advanced at different times which explain, more or less perfectly, large groups of phenomena of these processes, it must nevertheless be admitted that these theories are all seriously defective."

The writer, then, in the following chapters, sets forth his new theory. After carefully reading the book, we feel like saying, "The new things in it are not true and the true things are not new."

Volumes have been written on this subject, and that after years of study and original research; and while these theories may be seriously defective, they are not to be brushed aside by mere statements which are not substantiated by careful and continued scientific research. The writer does not show that familiarity with his subject that one would expect when writing on that which is so complex.

Many errors which might be charged to the printer, if not for the frequency of occurrence, warrant us in making this assertion; most markedly inaccurate is the arrangement of pathogenic bacteria.

The subject is one too deep for the ordinary practitioner, yet the reader who is fairly familiar with the subject becomes here bewildered in the fog of words and complex sentences. The book shows that an immense amount of work has been done for which we must give the author credit, at the same time we cannot help saying that little has been accomplished.

The volume is neatly printed and handsomely bound. D. B. K.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

THE DIFFUSION OF CERTAIN SUBSTANCES WHEN INJECTED INTO THE BLOOD.

DR. J. VERHOOGEN has made some researches concerning the diffusion of toxic or medicinal substances in the organism. After subcutaneous injections of morphine in dogs, it was found that—whether the alkaloid was not uniformly diffused, or was more rapidly destroyed in different organs—it had accumulated by preference in the liver, in bone-medulla, and in the spleen. If the animal was killed before complete diffusion had taken place, the blood contained a very large amount, and the muscle hardly any, although even now the liver, spleen, and medulla were already charged with the poison beyond what was found elsewhere. Nor is the accumulation a consequence of the amount of blood contained in the organ, for the proportion of morphine is greater than that found in the blood. Experiments with iodide of sodium showed that the blood readily held this salt, and in greater proportion than the tissues. The liver shows a considerable accumulation, but only for a short time, because the elimination by the kidneys is rapid. The above results were determined by chemical analysis. With carbonate of lithia the spectroscope became available. By this method it was found that the salt rapidly accumulated in the liver, and was after some hours completely eliminated. It is evident that some tissues, as the muscular, pulmonary, and nervous, have but little affinity for the alkaloid, while others—liver, spleen, and medulla—take up amounts greater than those found in the blood. In the case of the salt, muscle and nervous tissues yield but little by analysis; the liver contains considerable, but the greater portion remains in the blood and passes directly into the urine. The localization of these substances in the liver is not due to its situation, for other vascular glands possess an analogous power, and this is even true of medulla. The liver is the organ in which

chemical changes are actively and incessantly carried on, and with these changes going on we find the alkaloids retained in the liver and modified by it. That strychnine, quinine, and nicotine are thus acted upon was shown by Jacques. That the same is true of hyoscyamine is now shown, although a certain time is required for the modification to be complete, so that its physiological properties are lost. Whether the chemical action is the same for all alkaloids, and what this action is, and whether like changes take place in other organs when accumulations are found, are problems that at present cannot be solved.—*Journal de Médecine, de Chirurgie, et de Pharmacologie*, 1892, fasc. 2 et 3, p. 197.

SALOL AS AN INTESTINAL ANTISEPTIC.

DR. E. MANSEL SYMPSON has found in cases of duodenal indigestion that a preliminary four or five grain dose of calomel, followed in an hour by ten-grain doses of salol every four hours "acts like a charm." In infective diarrhœa this remedy is exceedingly useful. In ordinary diarrhœa there are few remedies which will more speedily check the flow and pain than ten-grain doses of salol. In typhoid fever he uses this remedy, not so much with the idea of combating the specific poison, but of cleaning and keeping clean the intestinal tract, and so subduing the irritation of the glands of Peyer's patches and other ulcers there, and that caused by the secretion from these ulcers in the intestine. It also prevents the excessive formation of wind, which is sometimes so vexatious a trouble to the patient. The temperature is generally brought down a degree or two, and there is abundant respiration. No bad effects were noticed in regard to delirium. The amount given was ten grains, suspended by means of compound tragacanth powder, every four to six hours, and during the last week three times a day after food.—*Practitioner*, 1893, No. 302, p. 102.

A STUDY OF ASEPTIC PEPSIN.

DR. ADOLPH GEHRMANN believes that the least that can be required of such pepsins is that they shall contain no living or viable organisms; partial sterility will not suffice. Theoretically it may be argued that in the preparation of predigested food, the milk or other ingredients of the food must remain uninjured by bacterial growth; that when added to sterilized milk the milk will remain sterile, or when administered as pepsin no bacteria are placed in the stomach to menace an already diseased digestive tract. The pepsin and the prepared foods, administered under the same exact technique that preserves sterility of culture material in the laboratory, would offer valuable results. Practically such administration is impossible; the opportunities and chances of infection are numerous. The ordinary means of sterilization cannot be employed in the preparation of pepsin, which is a highly sensitive, unorganized ferment, becoming inactive after a short exposure to a temperature of 128° F., and being injured by contact with most antiseptics, alcohol soon rendering it inert. Being an albuminous body, it offers an excellent nutrient material for bacterial growth. Heat-sterilization can only destroy a small part of the organisms contained without destroying the pepsin. Evaporation in a vacuum will not sterilize pepsin in solution, because

bacteria readily resist absence of oxygen, and some even, being anaërobic, would enjoy the new condition. Sterilization by gases has also been proposed, more particularly by sulphur dioxide gas, but the difficulty of effectual application makes it of doubtful value. Eleven samples of aseptic pepsins were examined, and it was found that in the agar tubes cultures regularly appeared; they were also obtained from the flasks of sterile water, and milk became decomposed in from two to ten days. In a few instances determinations of the digestive power of the samples were made. It was found that they were usually of very high grade, products of unusual activity from which most of the dirt usually present had been removed; they are clean but not aseptic preparations. He concludes: 1. Aseptic pepsin is only of value in theory. 2. It is impossible to sterilize pepsin by the usual methods. 3. The aseptic and similar pepsins now offered to physicians are not aseptic, viable cultures being regularly obtained from them. 4. The pepsins in question are simply clean preparations of high-grade dissolving power.—*The North American Practitioner*, 1893, No. 5, p. 219.

DIRECT ELECTRIZATION OF THE STOMACH.

DR. MAX EINHORN records his further experience with the deglutable electrode, submitting the following as a *résumé*: Physiologically—1. Direct gastro-faradization ordinarily increases gastric secretion, even during the first period after electrization. 2. The absorbent faculty of the stomach is considerably accelerated directly after the gastro-electrization (faradization and galvanization). Therapeutically—1. Direct gastro-electrization is a potent agent in the field of chronic (non-malignant) diseases of the stomach. 2. Gastro-faradization appears especially useful in most cases of dilatation of the stomach and enteroptosis; further, in atonic conditions of the cardia (ructus) and pylorus (presence of larger amounts of bile in the stomach), and in chronic gastric catarrh (gastritis chronica glandularis). 3. Gastro-galvanization is almost a sovereign means for combating severe and most obstinate gastralgias, no matter whether their origin is of a nervous nature or caused by a cicatrized ulcer of the stomach. 4. Gastro-galvanization exerts also a favorable influence on several affections of the heart complicated with gastralgia.—*New York Medical Journal*, 1893, No. 762, p. 29.

ENTEROCLYSIS IN THE SUMMER DIARRHŒA OF CHILDREN.

DR. R. E. MÜLLER gives the results of laboratory investigations, and reports seventy-eight cases, classified as 1, simple; 2, infectious diarrhœas. The simple diarrhœas constitute a small percentage, being symptomatic of derangement of function in the intestinal tract, unaccompanied by fever, and without involvement of the stomach. These cases respond readily to intestinal irrigation with cool or tepid water, and often to enteroclysis with a saline solution, followed by a restricted diet. The infectious diarrhœas are subdivided into three forms—the mild, the severe, and the choleroïd. They depend upon ptomaine poisoning, the toxic matters being formed either in the milk, outside of the body, or in the intestinal tract, from bacteria introduced with the milk. The first indication embraces the sterilization of the

milk, the second the support of the patient until the toxic matters are thrown off—that is, alcohol, either as whiskey or brandy, in almost all cases. He concludes: 1. That intestinal irrigation may be considered a valuable adjunct in the methodical treatment of suitable cases of summer diarrhœa. 2. That irrigation with cold or iced water will lower the temperature of the lower part of the abdomen by direct refrigeration of the blood-mass, and the procedure is indicated when high temperature, lasting for a considerable time, endangers life by coagulating the cerebral fluid or cardiac protoplasm, or when accumulation of feces, mucus, etc., in the bowel causes a continued irritation of its mucous membrane. 3. That the dangerous effects of the poisonous animal alkaloids are either diminished, or counteracted, or dissipated by irrigations. 4. That the influence on the circulatory apparatus is shown by the change in the pulse, which becomes less frequent and stronger. 5. That systematic enteroclysis results in an amelioration of the symptoms and a shortening of the course of the affection, and will often overcome the semi-paralytic condition of different organs. 6. That the resistance which the fever offers to its reduction by this method is an index of the gravity or mildness of the case.—*Therapeutic Gazette*, 1893, No. 7, p. 433; No. 8, p. 54.

SALACETOL IN THE TREATMENT OF DIARRHŒA.

DR. BOURGET presents his studies upon this remedy, which is a combination of salicylic acid and acetol, and possesses all the chemical and physiological properties which make salol an intestinal disinfectant of the first rank. It is a white crystalline powder, insoluble in cold water; is first decomposed in the alkaline fluids of the small intestine; the salicylic acid accomplishes the asepsis and the acetol is rapidly eliminated as acetone. This remedy contains 75 per cent. of salicylic acid against the 60 per cent. of salol. It apparently eliminates the salicylic acid more rapidly in a solution of castor oil because the latter provokes a more abundant secretion of the intestinal fluids. He has treated a large number of infectious diarrhœas, and on only one occasion was he obliged to resort to laudanum. The dose is thirty to forty-five grains in an ounce of castor oil, taken in the morning, fasting. Rarely is it necessary to be repeated on the following day, although no inconvenience results should it be repeated. Under this dosage the sulphur compounds (indican, cresyl-sulphates, skatoxyl-sulphate) are diminished and reach their normal (one-tenth of the simple sulphate) within three or four days, showing that disinfection is rapid. Good results were also obtained with this remedy in subacute and chronic rheumatism.—*Correspondenzblatt für Schweizer Aerzte*, 1893, No. 14, S. 481.

CREASOTE IN TUBERCULOSIS PULMONUM.

DR. J. T. WHITTAKER has carefully reviewed the literature of this remedy. He concludes: 1. Creasote, when pure, is harmless. 2. It has no direct action upon the tubercle bacillus. 3. Tuberculosis pulmonum is chiefly a secondary infection by a streptococcus. 4. Creasote has no direct action upon this streptococcus; hence none whatever upon hectic fever. 5. It destroys lower organisms, especially those which produce fermentation, with-

out affecting the process of digestion. 6. The beneficial action of creasote, which is undeniable in most cases, is chiefly, but not wholly, upon nutrition. —*Therapeutic Gazette*, 1893, No. 7, p. 438.

THE TREATMENT OF TUBERCULOSIS IN CHILDREN.

DR. CLEMENTE FERREIRA finds that creasote administered by the mouth is generally remarkably well borne, whether in pill form or as drops in milk, by very young infants. The daily dose is increased to the limit of seven grains without giving rise to any digestive or urinary disturbances; on the contrary, the appetite improves and the nutrition is bettered, the weight gradually increasing. The local signs gradually diminish, and after four to six months are difficult to detect. Used hypodermatically in sterilized olive oil, sometimes with iodoform, creasote produces excellent results, but more slowly than when given by the mouth. In addition, the possibility of local accidents, and the interference of the mothers, who regard the injections as painful, are reasons which limit this method to exceptional cases. Guaiacol can be administered by way of the mouth in astonishingly large doses. After a time the daily dose of sixty grains can be attained, and that without gastrointestinal disturbance. In general the results are equally good as with creasote, the large doses being better borne. Hypodermatic injections do not present the advantages which compensate for the inconveniences of the same. Aristol administered hypodermatically to seven grains per day has not given either general or local improvement; nor by the mouth have the results been so marvellous as those obtained by Nadaud in adults. Iodoform is frequently of great usefulness, but it must be continued for a long time and frequently develops an intolerance which necessitates its interruption. The cantharidate of potash, used in doses of $\frac{1}{250}$ of a grain, hypodermatically, and repeated every six days, has been well borne, the kidneys not showing any disturbance. The local signs have improved, and in one of the two cases the general condition was benefited. The method of Lannelongue (injections of chloride of zinc) was used in two instances. In the one the local manifestations (tuberculosis of submaxillary glands) underwent a remarkable diminution; in the other (tuberculosis of the hip) an abscess resulted, which was aspirated, and improvement resulted from the administration of creasote in increasing doses. —*Bulletin général de Thérapeutique*, 1893, 28. livr., p. 68.

GALLOBROMOL.

DR. LÉPINE states that this is the pharmaceutical name for dibromo-gallic acid, which has the chemical formula $C_6Br_2(OH_3)CO.OH$. It is gallic acid in which two atoms of bromine have replaced the two remaining hydrogen atoms of the benzin radical. It occurs as fine white needles, very soluble in alcohol, ether, and boiling water, and sufficiently soluble in cold, so that it can be administered in solution. Internally it is prescribed in wafers in dose of seven grains. Thus administered it may give rise to gastric heaviness, and it is better exhibited in gooseberry syrup. It is used as a bromide in epilepsy, for the purpose of diminishing the attacks. Basing an opinion upon a small number of cases, it appears to be less efficacious than the potash salt—perhaps,

even, it is harmful. In other conditions, notably a case of chorea, which is not likely to be much benefited by the bromide of potash, it seems to be of use. Although an organic combination of bromide might be assumed to be less likely to be dangerous than an inorganic salt, yet it is emphatically stated that caution must be observed, and that two drachms and a half per day is to be used with care; and that three and one-half drachms is an enormous quantity.—*La Semaine Médicale*, 1893, No. 40, p. 313.

FUNCTIONAL MODIFICATIONS PRODUCED BY APOCODEINE.

M. L. GUINARD has found, in his physiological studies, that the action of this drug upon the heart (dogs), after a primary acceleration, is one of slowing, without modification of force or rhythm, and that the normal irregularities are lessened in number. This slowing is entirely of central origin, and takes place by way of the pneumogastric. Its effect upon the vascular system is to diminish pressure rather from the slowing of the heart than from active vaso-dilatation. As to the respiratory movements, there is at first a brief period of acceleration followed by a slowing which becomes more and more marked and attains its maximum during sleep, which is calm during the period that the respiratory and cardiac movements are undergoing a pronounced slowing. There is also a progressive lowering of the temperature which accompanies the sleep, and equally a diminution of the amount of carbonic acid gas in the respiration, as well as of the oxygen absorbed by the lungs. The lowering of temperature depends chiefly upon the muscular repose, but also upon the slowing of the heart and respiration, and the slight diminution of the intra-organic combustion. Upon the glands it can be said that there is a salivary hypersecretion, and also an increase of the biliary, pancreatic, and intestinal secretions. It appears certain that this hypersecretion is not the result of an action upon the glandular elements any more than upon the terminations of the excito-secretory nerves. Through its action upon the sympathetic ganglionic centres, there is a considerable exaggeration of intestinal peristalsis. From the preceding experiments it is apparent that this drug acts strongly upon the nervous structures. Since direct experimentation shows that it has an elective action upon the brain, which is at first depressant, but not exclusively here—it can as well influence the medulla or bulb. With larger doses, or more rapid administration, convulsive movements may ensue. Upon peripheral nerve elements we find also the depressing effects. At the point of injection is obtained a motor and sensory paralysis and a gradual, progressive enfeeblement of the muscles of other regions. This result probably takes place through the nerves, these being the last to be affected, the higher nerve centres being the first. From these observations it is apparent that this remedy can be a valuable synergist to the anæsthetics.—*Lyon Médical*, 1893, Nos. 29, 354; 30, p. 391; 31, p. 433; 32, p. 464.

THE CHANGES IN THE URINE AFTER ADMINISTRATION OF THE GLYCERIN EXTRACT OF THE THYROID GLAND.

DR. WILLIAM M. ORD and MR. EDMUND WHITE have very carefully observed the urine of a patient suffering from myxœdema, while undergoing

this treatment. They conclude: 1. That the urine is increased in volume. 2. The nitrogen excreted in the urine exceeds the total quantity of nitrogen in the food. 3. The phosphoric acid and chlorine elimination are practically unaffected. 4. The increased nitrogenous excretion is chiefly in the form of urea. 5. The body weight is rapidly diminished. 6. The temperature of the body is raised.—*British Medical Journal*, 1893, No. 1700, p. 217.

TETANUS TREATED BY SERUM.

PROF. MORITZ reports a single case, with comments upon the existing literature, especially that of Behring. A twelve-year-old boy, who was placed under treatment eight days after the first symptoms were noticed, completely recovered in a month. In this case, although the symptoms were unmistakable, the point of entrance and the time of infection could not be determined. Presumably this was a chronic form of the disease, and on that account, of a more favorable prognosis.—*Münchener medicinische Wochenschrift*, 1893, No. 30, S. 561.

THE SERUM-THERAPY IN VARIOLA.

PROF. B. AUCHÉ believes that in this disease we have an opportunity for the success of this method of treatment. The serum was obtained from a healthy man who had suffered from a discrete and moderately intense variola six weeks before. For the second case it was obtained from a young man who had recently recovered from a slight discrete variola, the interval of time not being stated. In the first case the disease appeared with grave general symptoms, the eruption developed in the usual manner, but after the injection of the serum the eruption was checked in its progress and suppuration did not take place. As the patient had never been vaccinated, the conditions were favorable for a severe type of the disease. In the second case, although a larger dose was administered, the progress of the disease was unchanged. Perhaps the cause of the failure was the lateness of the injection—too late to abort the disease. The results of serum-therapy in man do not coincide with those found on experimentation with animals. The explanation of failure in the former instance is to be found in the fact that an accurate diagnosis is not obtained and the treatment begun until the disease has been thoroughly established and the system completely invaded. The amount of serum used was one and a half to two drachms injected into the buttocks.—*Archives Cliniques de Bordeaux*, 1893, No. 7, p. 317.

ETHER NARCOSIS.

DR. N. KAEFER reports one hundred and fifty cases which he has carefully studied. He believes that the greatest demands in ether narcosis are made upon the organs of respiration. Although it is easier to watch the respiration, yet it is undoubted that many pulmonary conditions are contra-indications to the exhibition of ether. The great advantage is admitted in the favorable influence upon the heart. That it is inflammable is a disadvantage. The duration and frequency of the stage of excitement as compared with that of chloroform, he does not determine. He concludes by advising the use of

ether, not entirely prohibiting chloroform, but limiting its use to the minimum.—*St. Petersburger medicinische Wochenschrift*, 1893, No. 25, S. 233.

THE ADMINISTRATION OF CHLOROFORM IN HYDERABAD.

MR. M. G. NAIDU believes that this administration has been reduced to a fine art at Hyderabad. If the patient's respiration is kept regular and normal during the inhalation, the anæsthesia will be normal and free from risk. The heart and pulse are entirely ignored as regards the effect of the chloroform, and the aim of the chloroformist, whilst producing complete anæsthesia, is to see that there is never throughout the whole administration the smallest possibility of the patient inhaling an overdose. The inhalation should be begun gently with quiet, natural breathing. The cap should be removed with the establishment of complete anæsthesia. The abolition of the corneal reflex is the safest guide to this under ordinary circumstances. The drug should not be pushed to the extent of producing stertorous breathing, unless this occurs incidentally at an early period. In the ninety-one cases where chloroform was used, full anæsthesia was produced in the average time of less than three minutes, and the average amount employed for each case was 2.7 drachms.—*Lancet*, 1893, No. 3650, p. 365.

METHYLENE-BLUE.

DR. A. MATIENZO reports, in a paper read before the Medical Academy of the City of Mexico, nine cases of intermittent fever in which he has used this drug. He concludes from these observations, and from the results obtained in experiments upon the blood—1. That methylene-blue has a quick and sure antiperiodic action on malarial fever, causing the access to disappear in the majority of cases. 2. That it can be substituted for quinine in many cases where the latter is indicated or where it has no effect. 3. In serious cases of malarial infection, especially in pernicious manifestations, quinine should always be preferred.—*Reprint, La Gaceta Médica*, 1893.

M. G. RICHARD D'AULNAY has used methylene-blue as a remedy for different infectious diseases, and particularly in purulent vaginitis. Nine cases are reported in considerable detail. The formula is: Methylene-blue, 10; alcohol, 15; potash, 0.20; water, 200, which is used for moistening the tampons of absorbent cotton. In the different uses which he has made of this remedy in lesions of the mouth, fistulous tracts, in the urethra in women, and particularly in vaginitis, he has found it to act directly as a bactericide. In vaginitis the method of application is simple, the results excellent in the cessation of discharge and relief of pain.—*Bulletin général de Thérapeutique*, 1893, 18. livr. 396.

KAVA-KAVA IN GONORRHOEA.

DR. JOHN E. BACON has studied the physiological action of the drug, which contains a crystalline principle, methysticin, and an acrid resin, kavin. He has used a fluid and a solid extract of the root. A full dose of the fluid extract gives rise to a pronounced anæsthesia of the tongue and mucous membrane of the mouth and throat, lasting ordinarily about an hour. No

irritation is produced by the fluid extract, but the solid, brought in contact with a mucous membrane, causes considerable pain, followed after a time by a complete loss of sensibility which persists for a period varying from twelve hours to three days. Therapeutic doses of the fluid extract (one-half to one drachm every four hours) increase the force and frequency of the pulse, increase the amount and diminish the specific gravity of the urine, and render it alkaline. He reports eighty-two consecutive cases of gonorrhœa. It relieves the *ardor urinæ*, scalding, and painful micturition, and by its anæsthetic effect lessens the pain and irritation. It will control and cure an ordinary case in from fifteen to thirty days without recourse to any topical treatment. He believes that it does this by controlling the symptoms, and by a certain antiseptic action due to its intense alkalinity. Stricture very rarely follows an attack. In five cases only did failure occur, and in these the urine remained acid in spite of large doses of the remedy.—*American Therapist*, 1893, No. 12, p. 304.

[To those who have confidence in the internal treatment of gonorrhœa we commend this paper. This remedy has enjoyed an excellent reputation in France for many years, and our observations, in the main, confirm the conclusions presented.—R. W. W.]

PICHI—A REMEDY FOR DISEASES OF THE URINARY ORGANS.

DR. M. FRIEDLAENDER has used this remedy in the dose of a teaspoonful of the fluid extract, thrice daily, either clear or with a little sugar. The taste is not disagreeable, nor does it give rise to digestive or renal disturbances, or eruptions, as do balsam of copaiba or oil of sandalwood. He has employed it for cystitis, prostatitis, neuroses, acute gonorrhœa, and epididymitis. He has found this remedy to be especially useful in conditions of marked purulent discharge, as gonorrhœa and cystitis.—*Therapeutische Monatshefte*, 1892, Heft 7, S. 350.

OXYCHINASEPTOL AS AN ANTISEPTIC.

DR. C. STEINMETZ records his experience with this drug, otherwise known as diaphtherin, which he has used in about forty cases within three months. It appears to be as serviceable as other antiseptics, for example sublimate, in a 1 per cent. solution for irrigation and moist dressings. If a caustic action is desired, it can be used in from 10 to 50 per cent. ointment with vaseline, and this may be necessary in sluggish wounds. It is useful also as a 1 per cent. gauze, either in primary wounds or after curetting. Eczema occurred in only one instance, and that in a child predisposed to this disease. Although it is soluble in water, it presents the disadvantage of staining instruments and coloring the nails yellow. No symptoms of poisoning have been observed.—*Münchener medicinische Wochenschrift*, 1893, No. 31, S. 582.

THE ACTION OF SODIUM OXALATE ON VOLUNTARY MUSCLE.

MR. F. S. LOCKE finds that frog's muscle immersed in a 0.75 per cent. sodium oxalate solution, becomes in a few seconds violently active, undergoing an exaggeration of the movements of similar muscle in a "normal saline

solution." In the course of one-half to three-quarters of an hour it becomes motionless, but does not pass into rigor, being little if at all shortened, and retaining all the flexibility and other characteristics of still living muscle. The addition of a small percentage (0.025–0.1) to a pure 0.6 per cent. sodium chloride solution increases greatly its chemically stimulating action, and equally, what may be termed for shortness sake, its veratrine-like action. In all probability this action of sodium oxalate explains the *fibrillares muskelsucken* and *starkes muskelszittern*, which as a symptom of sodium oxalate poisoning has hitherto been ascribed to its action on the central nervous system.—*Journal of Physiology*, 1893, Nos. 1 and 2, p. 119.

The following papers are worthy of notice:

"The Latest Investigations of the Pharmacology of Iron," by DR. A. JAQUET, in the *Correspondenzblatt für Schweizer Aerzte*, 1893, No. 13, S. 449. A careful study of this important subject, bringing the literature up to date.

"The Action of the Trionals," by DR. KOPPERS, in the *Internationale klinische Rundschau*, 1893, No. 24, S. 1082. A very complete and favorable clinical report.

"The Therapy of Nutrition," by DR. E. LEYDEN, in the *Deutsche medizinische Wochenschrift*, 1893, No. 22, S. 513. A statement of existing theories, but hardly definite enough to be of practical value.

MEDICINE.

UNDER THE CHARGE OF

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REFLEX HEMIANASARCA.

RENDU (*La Semaine Médicale*, 1893, No. 41, p. 321) has reported the case of a man who was seized with pain in the left side and posteriorly—at first dull, but subsequently sharp. He continued at his work, complaining, however, of headache, pain in the back, indigestion, anorexia, constipation, and a little cough; at night there was a little fever. At the end of three weeks the man presented a prominence at the base of the left half of the chest, with dulness on percussion; below the left clavicle the percussion note was tympanitic. Vocal fremitus was diminished; the heart was not displaced; at the angle of the scapula, blowing breathing and bronchophony were to be heard, but no ægophony and no pectoriloquy. In the area of dulness the breath

sounds were feeble; râles could not be heard. Upon the right side some fine râles were heard at the base, with some impairment of the percussion resonance. In the præcordium pleuro-pericardial friction sounds could be heard. The heart was normal and the urine contained no albumin. By exclusion, a diagnosis of spleno-pneumonia of influenzal origin was made. Remittent fever, with vesperal exacerbations, persisted, notwithstanding the administration of quinine sulphate and the application of a blister to the chest. The pleural friction sounds disappeared, but the pulmonary signs and the dyspnœa persisted. The temperature remained slightly elevated. The bronchial breathing extended from the scapula to the base of the lung. Applications of wet cloths to the chest afforded relief, but interfered with perspiration. Finally, there suddenly developed, without appreciable cause, an œdema of the chest-wall at the level at which the blowing breathing was heard, extending thence to the lumbar region and to the left thigh. At the same time local fremitus disappeared, the vesicular murmur became enfeebled, and ægophony was heard in a circumscribed area. Exploratory puncture disclosed the existence of a serous effusion of small volume. The œdema extended, progressively involving the trunk, the scrotum, the buttocks, the thighs, and the legs, predominating, however, upon the left side. Heart and urine still presented no abnormality. Fever persisting, the dyspnœa and the general condition becoming more distressing, and the fluid continuing to accumulate, a portion of the effusion was evacuated by puncture. Dry cups, scarification, digitalis, purgation, and a milk diet were followed by no improvement. The fever, however, ultimately subsided, leaving anorexia, emaciation, cachexia, and anasarca, while the signs of pleural effusion became more and more pronounced, until the vocal fremitus had entirely disappeared and the breath sounds could no longer be heard. Râles were heard at the base of the lung, but the heart was not displaced. The removal of some six ounces of fluid was followed by considerable relief. Thereafter the morbid phenomena gradually receded, the flow of urine became progressively augmented, and the œdema gradually disappeared. Sleep and appetite returned and recovery ensued. The duration of the illness was about eleven weeks. The œdema is explained upon the basis of a reflex paralysis of the vasomotor nerves of the affected regions secondary to the pulmonary condition.

A CASE OF CEREBRAL SYPHILIS.

BROUSSE (*Montpellier Médical*, 1893, No. 4, p. 608) has reported the case of a woman, twenty-two years old, who was found at the foot of her bed, semi-comatose and unable to move or to explain her condition. Examination disclosed the existence of a complete left hemiplegia, involving the face as well as the extremities, but without anæsthesia; there seemed to be a slight degree of hyperæsthesia upon the left side. The muscles of the upper part of the face and the ocular muscles were not involved; the pupils were dilated. No lesion of the heart or great vessels was to be detected. The woman presented numerous syphilitic stigmata. There were large patches of discoloration upon the anterior aspect of the chest and eruptions of diverse character and at different stages upon the thighs and legs, as well as the remains of healed gummata, and on the left thigh a gumma in process of

ulceration. Mercurial inunctions were at once instituted and the administration of potassium iodide begun, while mercurial plaster was applied to the ulcerating gumma and a gargle of potassium chlorate was prescribed. In the course of a few days intense stomatitis with copious salivation developed, and the mercury had to be withdrawn, the iodide, however, being continued. Appropriate treatment was directed to the condition of the mouth. The woman's condition meantime improved. The apoplectic condition began to recede, and she was soon able to give an account of herself. It was learned that her mother had died in attack of apoplexy at the age of forty-five years. She herself had acquired dissolute habits at the age of sixteen, and at the age of seventeen contracted a chancre of the left labium minus. Subsequently there developed a malignant syphilis of rapid evolution. For several years there had been intermittent headache, which later became dull and persistent and was referred particularly to the right frontal region. There was neither vertigo, convulsions, nor impairment of vision. For a year menstruation had been entirely suppressed. After a night of excessive venery the woman was overcome and fell at the foot of her bed, although consciousness was not entirely lost. In this condition she was found, defiled by her urine and her stools, which she had involuntarily passed beneath her. The woman believed that the attack coincided with the time for the occurrence of menstruation. In the further progress of the case subcutaneous injections of mercury benzoate were instituted, the iodide being at the same time continued. With this treatment there was progressive improvement as regards motility, but the general condition remained poor. At the end of twelve weeks, without apparent cause, a violent epileptiform attack occurred, and was soon followed by others in rapid succession. The attacks were characterized by clonic convulsions in the extremities of the right side, with tonic spasm of those of the left, and conjugate deviation of the head and eyes to the left. The action of the heart was at the same time extremely rapid, and there was profound depression, but there was no elevation of temperature. Some relief was afforded by the subcutaneous injection of ether and the administration of bromide. These attacks were followed by great weakness and an increase of the left-sided paresis. From this time the condition of the woman grew progressively worse. Right-sided pneumonia developed, which was thought to be tuberculous, although repeated examination of the sputum failed to disclose the presence of tubercle bacilli. Troublesome diarrhoea additionally set in; the state of weakness grew more profound, and death took place amid the symptoms of asphyxia. At the post-mortem examination the calvarium and the cerebral membranes presented no abnormality other than a notable thinning at the anterior superior angle of the parietal bone of either side, and a depression of the dura mater in the right frontal region. There was a large subdural accumulation of sero-sanguinolent fluid and injection of the pial vessels, particularly in the Rolandic region. There was also generalized cerebral oedema. To the touch the right Sylvian artery conveyed the sensation of a hard cord; its walls were greatly thickened. At the root of the third right frontal convolution was a circumscribed area of yellow softening, about as large as a nut, extending deeply and involving somewhat also the adjacent ascending frontal convolution. There was another, but smaller and superficial area of softening at the posterior ex-

trinity of the right Sylvian artery involving the angular gyrus. On making sections of the brain an extensive area of softening was found involving the anterior two-thirds of the caudate and lenticular nuclei, as well as the anterior limb of the internal capsule and the motor zone of the centrum ovale. The posterior third of the posterior limb of the internal capsule escaped. Pons, medulla, and cord presented tracts of descending degeneration. The right lung was adherent to the costal pleura. It presented the appearance of a fibro-caseous mass and was filled with yellowish miliary granulations, particularly confluent at the apex. The bronchi were filled with pus. The left lung was congested, particularly at its apex, but presented no granulations. During life it was thought the symptoms were dependent upon the presence of a gumma in the brain, but the autopsy demonstrated that the pathologic process was essentially a syphilitic endarteritis leading to anæmic softening.

GENERALIZED TUBERCULOSIS ESPECIALLY AFFECTING THE SEROUS
MEMBRANES.

SERGEANT (*Bull. de la Soc. Anat. de Paris*, t. vii., sér. 5, f. 15, p. 361) has reported the case of a girl, eleven years old, whose father had died at the age of thirty-three years with bilateral pneumonia, and whose maternal grandfather had been tuberculous. When eighteen months old the child had had convulsions for a week. From the age of seven to nine she had had slight epistaxis almost every morning. At the age of eight she had had whooping-cough lasting for three months, and at nine years she had had measles. For two months it had been observed that the child was rather depressed and always tired, complaining a good deal of pain in the thighs. Appetite was lost, and almost everything that was swallowed was rejected. There was almost constant headache. Emaciation and debility were quite pronounced. There was pain in the abdomen, but no tumor could be detected upon palpation, though there was evidence of the presence of fluid in the peritoneal cavity. The liver extended a finger's breadth below the margin of the ribs, but was not painful upon manipulation. The area of splenic percussion dulness was not increased. There was little cough, without expectoration; there had never been hæmoptysis. There was no dyspnœa and no thoracic pain. The pulmonary percussion resonance was slightly impaired at the summit of the chest; the breathing was roughened, and some fine râles were to be heard. The heart-sounds were feeble and distant. There was no palpitation and no præcordial anxiety. The pulse was rapid and small, and intermitted occasionally. The urine presented no abnormality. The bowels were constipated. The temperature, a little elevated, rose higher and became irregular and oscillating. Dyspnœa and pain in the chest later set in. An area of dulness became apparent in the outer part of the right infra-spinous region, and here the breathing was bronchial, and crepitant râles were to be heard. Later, pleural friction sounds were to be heard upon the right, and crepitant râles in other parts of the right lung and also in the left lung. The abdomen became progressively more and more distended and painful, while the dulness in the dependent portions became more pronounced. Finally, the patient was seized with convulsions, loss of consciousness, and anæsthesia. The attack lasted about two minutes, and was followed by copious perspira-

tion. An hour later a second attack occurred, and in the course of the day four others. Death took place at night during the ninth paroxysm.

At the necropsy two quarts of sero-purulent, flocculent fluid were found in the abdominal cavity, the walls of which, and loops of intestine as well, were in places lined by false membrane. The liver was large, fatty, and friable. The spleen was of usual size, deep-red in color and rather deficient in consistency. Upon its surface were numerous disseminated yellowish granules. The kidneys presented little change beyond congestion. The jejunum and ileum contained several small superficial ulcers, marked at the periphery by little granulations visible upon the peritoneal surface. At the junction of ileum and cæcum there was a confluent mass of granulations also visible upon the peritoneal surface. The visceral peritoneum presented many granulations, and the mesenteric glands were enlarged. The right pleural cavity contained a small quantity of sero-purulent fluid. The right lung was extensively adherent to the parietal pleura, especially posteriorly and at the lower part of the upper lobe. At this point there was a thick layer of pseudo-membranes, in the midst of which was a large number of granulations. The lung beneath this, in an area perhaps equal to that of a small orange, exhibited a condition of caseous pneumonia. Adjacent to this, both superficially and profoundly, were numerous granulations, diminishing in number as this focus was receded from. Elsewhere upon the surface of the lung were scattered granulations, most marked, however, at the interlobular fissures. The left lung presented a small number of scattered granulations. The tracheal and bronchial glands were enlarged and caseous. At the hilus the right mediastinal pleura and the pericardium were adherent. The pericardium was distended to the size of a fetal head, and was in part covered by the left lung. An incision evacuated nearly two pints of hemorrhagic fluid. The membrane was lined by fibrinous exudation, beneath which many tuberculous granulations were visible. The heart was dilated, the myocardium flabby; valves and orifices were normal. The convexity of the brain was congested and presented slight exudation in the course of the pial vessels. In the anterior perforated spaces, and accompanying the Sylvian arteries, a number of granulations were visible. Tubercle bacilli were found in the pulmonary and pericardial lesions.

ANEURISM OF THE ARCH OF THE AORTA; RAPID DEATH BY ASPHYXIA,
WITHOUT NOTABLE OBSTRUCTION OF THE RESPIRATORY PASSAGES.

SIREDEY and DALCHÉ (*Revue de Médecine*, 1893, No. 7, p. 642) have reported the case of a charwoman, fifty-six years old, whose mother had died of carcinoma of the stomach at the age of forty years, and whose father had died anasarctous, but who, herself, presented no history of enteric fever, scarlatina, impaludism, syphilis, or other disease having a causative relation to affections of the circulatory apparatus. She had never borne a child nor had she had a miscarriage. Alcoholic excess was denied, although for several years there had been gastric derangement, with dyspeptic symptoms and disturbed sleep. There was epigastric pain following the taking of food, and headache was frequent and troublesome. There was slight cough, with other symptoms of bronchitis. For six or eight months there had been almost

constant oppression of the chest, with paroxysmal exacerbations, together with retro-sternal pain at the upper part of the chest. The cough later occurred in attacks frequently, and the oppression became almost intolerable upon the slightest exertion. At the same time some little difficulty was experienced in gluttony, and at times actual crises occurred, preventing the ingestion of solid food. At this time there was no sign pointing to disease of the vascular apparatus. Shortly, however, there appeared a globular tumor at the upper part of the sternum, presenting slight pulsation and having its long diameter transversely. The tumor was elastic to the touch, and transmitted an expansile pulsation, but no thrill could be detected. The skin in front of the tumor became reddened, œdematous, and painful upon the slightest pressure. Numerous small varicose vessels made their appearance upon its surface. The superficial veins of the anterior thoracic wall were but little enlarged. There was no œdema of the neck or upper extremities. The face was a little injected and reddened; the eyes were somewhat prominent; the left pupil was occasionally a little larger than the right. The pulsation of the transverse aorta could be felt at the supra-sternal notch, but that of the innominate, the left carotid, and the left subclavian did not appear unduly strong or superficial; the latter may indeed have been a little weaker and more profound than usual. The heart did not appear to be hypertrophied. The sounds were normal at the apex, but at the base a soft systolic murmur could be heard, transmitted to all parts of the tumor. Careful auscultation failed to detect more than this single murmur. The two radial pulses appeared to be synchronous and equal, though the right may perhaps have been a little stronger than the left. The voice had a peculiar timbre; the cough was dry and rough, but not aphonic. The breath-sounds had a bronchial character, most pronounced posteriorly at the root of the lungs, and more so upon the right than upon the left. The two most distressing symptoms were dyspnœa and dysphagia. Almost continuous, the dyspnœa was aggravated upon slight exertion, and attended with pronounced inspiratory bruit and transitory cyanosis of the face. The dysphagia was frequent, but most capricious in its occurrence. The urine presented no abnormality. In the further course of events the right arm became swollen and painful, and the right breast was also the seat of pain. Later, the right breast and then the right half of the thorax became œdematous. Symmetrical swelling of the neck and face developed, more marked, however, upon the right. The patient was finally compelled to go to bed, her distress being aggravated by every movement. Matters went from bad to worse, and amid the symptoms of progressive asphyxia death rather rapidly took place. At the post-mortem examination some ten ounces of serous fluid were found in the right pleural cavity, without other indication of pleurisy. The pericardial cavity contained less than four ounces of fluid, and presented a small amount of false membrane at its upper part, where it was also gently adherent in places to the aorta. The heart was not hypertrophied. The ventricular wall was rather soft, but there was no lesion of valves or orifices. The aorta was markedly atheromatous. Upon the convexity of its transverse portion was a globular aneurism, at least as large as the heart itself, well lined with clots, and communicating with the aorta by an orifice scarcely admitting two fingers. The great vessels were uninvolved, and were less atheromatous than

the aorta. The œsophagus and the trachea were patulous and not compressed by the tumor. The lumen of the left bronchus was slightly diminished from above downward and from before backward. There were evidences of anterior mediastinitis. The tumor had become adherent to and had caused considerable erosion of the adjacent bones and cartilages. The liver was congested, and on section presented a fatty appearance. There was a mild degree of perihepatitis. The spleen was of normal size; its capsule was a little thickened. The kidneys were diminished in size; the capsules stripped with difficulty, leaving a granular surface; there was some atrophy of the cortical substance. The brain presented no gross lesion, although in places there were points of ecchymosis upon the surface of the convolutions. The authors argue that as there was no single factor to which the rapidly fatal asphyxia could be ascribed, it must be assumed that this resulted from the sum of all the influences at work. These included the mediastinitis, the inflammatory process extending to the sheaths of the pneumogastric nerve and its recurrent branch, and the pressure, however slight, upon the adjacent structures.

SURGERY.

UNDER THE CHARGE OF

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CONTRIBUTION TO THE ETIOLOGY OF CYSTITIS.

IN an advance communication to the *Centralblatt für Chirurgie*, WREDEN gives the results of his experiments, which show that most inflammations of the bladder are caused by bacteria from the intestine, viz., the bacterium coli commune. The researches of Doyen, Clado, Hallé, Albarran, Roosing, Morelle, Denys, Schnitzler, and Krogus are thus confirmed.

This conclusion, and also the anatomical relation of the rectum to the bladder, led the author to conclude that the infection was not embolic, as Roosing thought, but a direct infection from the rectum. Such an infection, with different lesions of the epithelium of the rectum, seemed to him very probable, especially as in the male the rectum and bladder for a considerable distance lie close together, and have a rich lymphatic and vascular anastomosis.

Experiments confirming the author's suppositions were made as follows: In the rectum of rabbits hot water or croton oil was introduced, but more frequently the lesion of the epithelium of the bowel was caused mechanically.

For this purpose a platinum wire, which had a very short and flat hook at the end, to avoid perforation, was employed. The results obtained were as follows:

1. Lesions of the mucous membrane of the anus, even if repeatedly made, have no influence on the bladder.

2. Every lesion of the epithelium of the rectum at the border of the prostate and higher up, is followed by cystitis.

3. The character of the cystitis and its course depends entirely upon the degree of lesion of the mucous membrane of the rectum and the character of the medium that has caused the inflammation.

4. In cases of experimental cystitis there were found in the urine bacteria found in the intestine of the rabbit, or those bacteria which had been introduced into the rectum.

The experiments were made exclusively on male animals for the reasons given.

SPHINCTERPLASTY.

GERSUNG describes in the *Centralblatt für Chirurgie*, 1893, No. 26, two cases in which the function of the sphincter was restored after resection of the rectum. The unfortunate condition of a patient upon whom it has been necessary to establish an artificial anus is so well known as to make repetition unnecessary. The various apparatus intended to control the contents of the bowel are unsatisfactory. If the feces are liquid or semi-liquid they fail entirely, while if the motions are fully formed the bowel is so fully relieved at each evacuation that apparatus has only a moral value. The success of the suggestion to use the abdominal or gluteal muscles in the formation of a new sphincter remains to be demonstrated.

The patients upon whom Gersung operated were suffering from carcinoma of the rectum. After resection of the diseased portion it was found possible to draw the bowel down to meet the skin incision. The author then rotated the rectum on its long axis by catching, with a pair of forceps on either side, until the index-finger could be introduced only with some difficulty. The bowel was then stitched to the skin incision. Healing followed rapidly and perfectly. In the first case continence was complete. The second patient had some incontinence of liquid matter at first, but this was rapidly overcome. Digital examination before the patients left the hospital showed that the funnel-shaped contraction, caused by the twisting of the bowel, had changed to an annular constriction, giving about the same resistance as the normal sphincter.

A NEW METHOD OF AMPUTATION THROUGH THE LEG: SUBPERIOSTEAL AMPUTATION.

THE frequent occurrence of gangrene in the flaps after amputations through the leg led BRUN'S (*Brun's Beiträge zur klinische Chirurgie*, Bd. x.) to adopt the following method: A single circular incision is made, and the periosteum and the overlying soft parts separated from the bones, which are then sawn through. If needed, to give better access to the depths of the wound, two lateral longitudinal incisions may be made.

In twenty-two cases this method has proved very satisfactory; there was no instance of sloughing of the flaps, and the shape of the stump was excellent.

ON THE ADMISSIBILITY OF LIGATION OF THE FEMORAL VEIN.

TRZEBICKY and ST. KARPINSKI (*Archiv für klin. Chirurgie*, 1893, Bd. xlv. Heft 3), in repeating the experiments of Braun, found that in injecting the popliteal or smaller saphenous vein of cadavers, after ligating the femoral vein in eighteen of thirty-one cases, the injection-mass reached the veins of the abdomen, principally through the obturator vessels.

By making the injections in the iliac or femoral artery the results were better. Vertical suspension and oblique elevation of the extremity favored the venous discharge, but made the arterial flow more difficult. For this reason the authors advise, in practice, elevation of the limb, only in those cases in which the activity of the heart is not in the least diminished. Massage had no visible influence in these experiments. The authors conclude that ligature of the femoral vein is justified when tamponage or lateral ligation would not suffice.

RETENTION OF URINE FOLLOWING OPERATIONS.

GUÉPIN (*Gaz. des Hôpitaux*, 1893, No. 33) calls attention to the brief mention of this complication in the text-books, although it is of very frequent occurrence. It occurs at all ages after puberty, but, according to the author, never happens in children under fifteen years of age. There are two clearly defined clinical forms, an indolent and a painful. The first occurs in those having healthy urinary organs, and the latter in patients with diseased organs. The duration of the retention is very variable. The indolent form usually disappears after the use of the catheter; the painful form may last several days.

In explanation of retention of urine, many causes are mentioned, *e. g.*, swelling of the urethra, the dressing, the pain of the wound, paresis of the abdominal muscles, narcotics, etc.

Guépin gives the three following factors:

- a. Spasm of the urethra, particularly of the bulbous portion.
 - b. Paralysis of the bladder.
 - c. Abnormal position of the patient, *e. g.*, enforced dorsal decubitus, in which position many persons cannot urinate at all. In the treatment, the upright position should be assumed; this failing, a hot enema may be administered. If this is unsuccessful, a catheter should be employed, a soft one being preferable.
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CONTRIBUTION TO THE ANATOMICAL AND CLINICAL KNOWLEDGE OF CYSTS OF THE LONG BONES.

SCHLANGE (*Centralblatt für Chirurgie*, 1892, No. 30) reports five cases of this rare affection. In three instances the thigh was affected. About the seat of the affection a swelling was noted, due to fibro-cartilage or connective tissue overgrowth; in one case numerous giant cells were present. These, beyond question, result from the softening of tumors. The usual seat is in

the marrow of the bone near the end of the diaphysis. In these cysts, in common with echinococcus cysts of bone, fracture is frequently the initial symptom. Preceding the fracture the bone may undergo a slow bending, or the bending may occur without fracture. The author recommends complete extirpation of the cyst as the best method of treatment. When the tibia is affected a tumor-like focus is not apparent, nevertheless Schlange believes, in opposition to his former teaching, that the cysts result from softening.

INTUBATION.

PITTS, in a recent lecture (*British Medical Journal*, 1893, No. 1699) makes the following observations concerning the relative value of intubation and tracheotomy:

1. *The nature of the case.* Cases of a very malignant type, particularly those which arise in the course of scarlet fever or measles, are unsuitable for intubation, chiefly from the great tendency of the larynx to become ulcerated by pressure of the tube. In all cases where membrane is very extensive in the mouth, and there is a suspicion of extension below the larynx, early tracheotomy would seem advisable.

2. *The surrounding conditions.* Several of the American writers advocate intubation for cases in private practice, particularly amongst the poor, and when good nursing is not to be had, on the ground that, the intubation-tube once introduced, the child is in comparative safety; and if the tube gets blocked with membrane, it will probably be coughed out, and there will be a reasonable interval before dyspnoea recurs, sufficient to allow the medical attendant to arrive. Unfortunately, as we have seen by Dr. Turner's experience, there are exceptions; and we should be unwilling to intubate in private unless a medical man was living in the house competent to deal with any emergency. It is most unsatisfactory to have to do tracheotomy with unsuitable surroundings, but any intelligent person can be given instructions what to do if the tube gets blocked.

3. *The age of the patient.* Tracheotomy under two years is so very fatal that intubation would seem to offer the better chance if the larynx only is affected. In the Great Ormond Street cases three of the children were under eighteen months old, and yet two recovered.

4. *The previous experience of the surgeon.* It is most important that he should have thought carefully over the whole method of intubation, have previously practised it on the dead subject, and, better still, have had an extended experience on the living.

5. *The consent of the friends.* Consent might be obtained, when permission to perform tracheotomy had been refused, or if permission had not been asked, it would be right to give the preference to intubation.

DR. COLLIER'S experience has led him to the conclusion that intubation of the larynx is not a suitable procedure when laryngeal diphtheria is accompanied by diphtheria of pharynx, or of naso-pharynx, because:

1. The air thus supplied by the lungs, passing over the diseased surfaces, is impure, often foul, and, if not producing diphtheritic bronchitis, may produce broncho-pneumonia of the type of "cut-throat lung."

2. The obstruction is often not only laryngeal, but supra-laryngeal also.

3. The local treatment of the nose and pharynx is very difficult, owing to choking.

4. It is in this class of cases that the feeding of a laryngeal intubation case is so difficult.

Intubation of the larynx is also contra-indicated when one believes that there is membrane in the trachea.

1. Here apparently easy breathing usually results for a time; but while inspiration is relieved, the membrane acts like a valve over the end of the tube during expiration, and in this way extraordinarily rapid acute insufflation of lung is likely to occur. We have seen a chest become, in the course of eight hours, extremely barrel-shaped, with cardiac dullness quite hidden.

2. The expelling of membrane is extremely difficult, and usually attended by ejection of the tube.

On the other hand, Dr. Collier advises intubation in all cases of primary laryngeal diphtheria unaccompanied by supra-laryngeal obstruction, and without evidence of the existence of membrane in the trachea; in all such cases, indeed, as were until recently called "membranous croup."

A NEW METHOD OF DIRECT FIXATION OF THE FRAGMENTS IN COMPOUND AND UNUNITED FRACTURES.

SENN, impressed with the defects of previous methods of securing and retaining accurate apposition in cases of compound and ununited fractures, advocates (*Annals of Surgery*, 1893, vol. xviii., No. 2) the employment of hollow perforated intra-osseous splints or of bone ferrules. The author objects to the wire suture, because it frequently fails to maintain apposition, because he believes that in some cases the wire induces necrosis of the bone, and because a foreign body is thus permanently retained at the seat of fracture. Metallic spikes and screws are dismissed with the mere mention of the method. Ivory cylinders and clamps have proved successful in practice, but the ivory is less rapidly absorbed than bone, and in addition the presence of a solid cylinder in the medullary cavity is an objection. The hollow perforated intra-osseous bone-splint is equally efficient in securing fixation, and in addition the lumen soon becomes filled with valuable bone-producing material, and the new bloodvessels may reach the point of fracture through the numerous perforations.

It is recommended to make these cylinders of the shafts of the long bones of chickens, turkeys, or rabbits. The medullary cavity is to be increased in size by the use of a small round file, and the perforations made with a drill. The length of these splints should vary from one to three inches.

In cases of very oblique fracture the bone cylinder will not retain the fragments securely. For these cases Senn recommends the use of the bone ferrule. For the humerus and femur of the adult the ferrule should be prepared from the femur of the ox; for children the same bone of a smaller animal should be selected. For the tibia the corresponding bone of the ox is selected on account of the similarity in shape. It is recommended to make the sections of bone with a sharp saw, from one-quarter of an inch to an inch in width as desired. The medullary cavity is enlarged by means of a

round file, until the thickness of bone does not exceed one-sixth of an inch. Wide ferrules should be perforated.

The cylinders and ferrules are sterilized by boiling and subsequent immersion in sublimate alcohol 1 : 1000, until ready for use. The ferrule must be large enough to pass easily over the bone, otherwise it is apt to be broken. The ferrule is first slipped over the most accessible fragment, and after reduction is accomplished is passed along so as to engage the second fragment. At this point great care is needed to avoid bending the bone at the seat of fracture, which might break the ring.

In the use of the cylinder or ferrule a plaster-of-Paris dressing is to be applied to the limb to maintain immobility. A fenestra may be made at the seat of the wound to permit of dressing.

The following conclusions are added:

1. Direct fixation of the fragments is indicated in all compound fractures in which perfect retention cannot be secured by simpler measures, and in the treatment of ununited fractures requiring operative interference.

2. This method is also justifiable in the treatment of certain forms of subcutaneous fractures in which reduction and retention cannot be accomplished without it.

3. Free exposure of the fragments in compound fractures secures the most favorable condition for thorough disinfection.

4. Perfect reduction and direct fixation of the fragments, are the most reliable prophylactic measures against delayed union, non-union and deformity.

5. A compound fracture should be regarded in the same light as an injury of the soft tissues, and should be treated upon the same principles, viz., accurate coaptation of the different anatomical structures, and perfect retention by direct means of fixation, aided by an efficient external support.

6. Bone suture, metallic, bone and ivory nails do not furnish the necessary degree of support and immobilization in the direct treatment of fractures characterized by a strong tendency to displacement.

7. The solid intra-osseous splint of ivory or bone as advised by Heine, Langenbeck, and Bircher, is objectionable, because it interferes with the ideal production of the intermediate callus, and its spontaneous removal is beyond the absorptive capacity of the tissues.

8. The hollow, perforated ivory or bone cylinder, devised by the author, answers the same mechanical purpose without the objections which have been charged against the solid cylinder.

9. The safest and most efficient means of direct fixation of oblique fractures is by a bone ferrule, which must be applied in such a manner that it surrounds both fragments.

10. Such a circular absorbable direct splint prevents to perfection lateral and longitudinal displacement.

11. Rotation of the limb below, and angularity at the seat of fracture, must be prevented by a carefully applied circular plaster-of-Paris splint.

12. For fractures not requiring drainage, the entire wound should be closed by buried and superficial sutures, as the bone ferrule is removed by absorption.

13. In suppurating wounds the bone ferrule should not be removed until direct fixation has become superfluous by the formation of a sufficiently firm union between the fragments.

14. The external splint should be applied in such a manner that it does not require a change throughout the entire treatment, permitting at the same time access to the wound, should this become necessary.

15. Direct fixation of a fracture, combined with perfect immobilization, brings the different anatomical structures of the broken bone permanently into their former normal relations, preparing the way for the early initiation and speedy consummation of an ideal process of repair and the realization of a perfect functional result.

16. Should future experience demonstrate that bone is not sufficiently absorbable, the same kind of ferrules can be made of partially decalcified bone or chromicized catgut.

INJURIES TO THE EPIPHYSES AND THEIR RESULTS.

IN an interesting lecture delivered at the Royal College of Surgeons, JONATHAN HUTCHINSON, JR. (*British Medical Journal*, 1893, No. 1697), calls attention to the fact that injuries to the epiphyses is more frequent than is usually taught. He bases his observation on 350 cases, nearly 150 of which have not been published before. These injuries are of especial importance, because of the difficulty in diagnosis and the danger of arrest of development in the injured bone. The latter result is most prejudicial when one of the bones of the forearm or leg is affected. The author has shown by experiments on rabbits that the epiphysial disk has a remarkable vitality, and that when the epiphysis is accurately replaced, after being separated, the natural development of the limb usually follows. It is important to effect reduction as early as possible, because: 1. The rapid occurrence of swelling will make the diagnosis and correction of the exact displacement more difficult. 2. The connecting bridge of periosteum quickly thickens and shortens; from this cause, at the post-mortem of a rabbit, whose lower femoral epiphysis had been detached and allowed to remain displaced, it was found quite impossible by any reasonable force to effect reduction, although only eight days had elapsed since the injury. 3. The more prompt the replacement the less will be the risk of exuberant callus, of interference with growth, and possibly also of suppuration and necrosis.

The author refers to three "undoubted cases" of separation of the sternal end of the clavicle in patients aged twenty, fourteen, and seventeen years respectively. At about the twenty-fifth year the epiphysis becomes fused with the shaft.

In most cases of detachment of the upper epiphysis of the humerus the shoulder-joint is said not to be opened, particularly if the patient is under the age of twenty. The author says: "It is sufficiently accurate and a point of practical importance to say that separation of this epiphysis before the age of about twenty takes the place of dislocation of the shoulder-joint. How much trouble in treatment and discredit to the practitioner might have been saved if this fact were generally admitted. Time after time the doctor called to a case of separation of this epiphysis has pronounced it to be one of dislocation, has employed various methods of reduction, and has been mortified by the tendency to recurrence and the very indifferent result obtained."

In analyzing the records of 26 cases of this injury, 13 of which were ob-

served personally, in 6 instances the accident was found to have occurred at birth, and in 4 during the first year of life. Omitting these, the average age at which the detachment occurred was thirteen years; in 17 cases the patient was fifteen years of age or above. The following are given as the chief points in the diagnosis of separation of this epiphysis:

1. The age of the patient—under about twenty years.
2. The arm is comparatively helpless, the elbow often directed a little outward or backward.
3. Abnormal mobility just below the shoulder-joint, best made out by abducting the humerus.
4. Rapid swelling about the shoulder, some shortening if the diaphysis is wholly displaced.
5. Muffled crepitus on replacement.

Reduction is best accomplished by steady traction on the arm, slight abduction, aided by rotary movement, or by direct pressure. If the diaphysis protrudes just under the skin, and prolonged efforts at reduction fail, the end of the diaphysis should be exposed (with every precaution to asepsis), the opening in the periosteal sheath enlarged, or the rent in the other soft tissues held open, and the bone returned to its place. This has been done with success, even at the interval of several weeks from the accident; but it is then usually necessary to resect part of the diaphysis.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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MASSAGE IN THE NOSE AND THROAT.

DR. W. FREUDENTHAL, of New York, comes (*Medical Record*, 1893, No. 1185) to the support of Braun, Laker, and others in emphasizing the beneficial results of massage upon the circulation, both lymphatic and venous, in the mucous membrane of the nose and throat in the treatment of various diseased conditions. The necessary manipulations, which ordinarily require such a great deal of practice as to limit their acquisition to the few who are willing to go to the trouble of learning them, are now rendered easy by an electrically controlled vibrator devised by Dr. Freudenthal, and illustrated in his paper. The statements of Braun, Laker, and some others abroad, and now those of Freudenthal at home, are so positive for good that it is to be hoped similar good will follow in the hands of others who may be disposed to pursue the treatment now that its technique has become so much simplified by Dr. Freudenthal's electro-motor.

NASAL REFLEXES IN CHLOROFORMIC SYNCOPE.

IN a recent discussion before the Académie de Médecine (*Le Progrès Médical*, 1893, No. 28), M. GUÉRIN contended that irritation of the pituitary membrane at the commencement of the anæsthesia could provoke mortal syncope by reflex action. This view was confirmed by some experiments upon a tracheotomized rabbit before the Academy. An instrument for recording the cardiac movements being placed upon the thorax of the animal, it was seen that no change took place while the anæsthesia was given through the canula, while those movements became feeble, slow, and irregular when the chloroform was administered through the nose. M. Fort recorded a case of death due to sudden nasal inspiration of the vapor during the anæsthetization. The inference left is that the nose should be compressed and the anæsthetic be administered through the mouth at the commencement of the anæsthetization.

THE INFLUENCES OF NASAL DISORDERS UPON THE DIGESTIVE TUBE.

QUITE an elaborate paper upon this subject appeared in *Le Progrès Médical*, 1893, No. 28, from the pen of DR. FÉLIX CHABORY, of Mont-Doré. Commencing with the lips, attention is called to the herpes preceding the conclusion of an acute coryza; to various forms of eczema due to discharges from the nose; to œdema from furuncula and other diseases of the nose; to rhinoscleroma, tuberculosis, and lupus in extension from the same diseases in the nose; and to the thickened upper lip in some cases of adenoid growths. Then follow considerations on concomitant diseases of the palate, jaws, teeth, tongue, salivary glands, tonsils, uvula, pharynx, œsophagus, stomach, and intestines, including hernia as a result of abdominal pressure in violent or prolonged efforts of disembarassment from secretions pent up in obstructed nasal passages.

An excellent article for the scrap-book of the rhinologist.

THE BACTERICIDIC POWER OF THE NASAL MUCUS.

MESSRS. R. WURTZ and M. LERMOYER report (*Annales des Mal. de l'Oreille*, etc., 1893, No. 8) some experiments which support the theory that nasal mucus is inimical to bacteria and protective from them, and they intimate that it is to this property of the nasal mucus that the ordinary immunity from injury after intra-nasal operations must be attributed. [The compiler believes that Dr. Seiler, of Philadelphia, has long maintained this opinion of the antiseptic character of nasal mucus.]

ANÆSTHETICS FOR OPERATIONS IN THE NOSE AND THROAT.

MR. LENNOX BROWNE, of London, pleads (*Medical Press*, 1893, No. 2831) for the use of nitrous oxide gas in all cases where the operation consumes but few minutes. He particularly urges this gas in the removal or evulsion of lymphoid growths at the vault of the pharynx—adenoids—the time required for which does not exceed forty-five to sixty seconds. If ninety to one hundred seconds be required, the narcosis may be prolonged by supplementing ether vapor during the last few respirations.

Mr. Browne also prefers local anæsthesia for tracheotomies by means of hypodermatic injections of cocaine solution each side of the line of the incision—a practice usual with the present compiler since cocaine has been so used. Before the introduction of cocaine, the compiler for many years, more than twenty perhaps, always used local anæsthesia, at first produced with the topical use of ice and salt, and subsequently by refrigeration with sprays of sulphuric ether of low specific gravity, and later with sprays of rhigolene.

SCLEROMA OF THE UPPER AIR-PASSAGES AND BLENNORRHŒA.

PROF. CHR. LEMCKE, of Rostock, contends (*Deut. med. Wochenschr.*, 1893, No. 26) that the so-called Stoerck's blennorrhœa, or chronic blennorrhœa of the upper air-passages, is identical with the rhinoscleroma of Hebra and its congeneric manifestations, which, with Bornhaupt, he prefers to call scleroma respiratorium. His argument is enforced by the recital of two cases which are illustrated, and by the microscopic examination of the secretions which, with cultures from them, revealed the pathognomonic encapsuled bacilli peculiar to scleroma.

ŒDEMA OF THE LARYNX IN INFLUENZA.

DR. MARCEL NATIER reports (*Annales de la Polyclinique de Paris*, 1893, No. 7) three cases of œdema of the larynx during attacks of influenza in his own practice, and reproduces two from Cartaz's practice:

I. In a butcher, twenty-five years of age, the left vocal band was greatly œdematous and covered with a delicate membrane almost transparent. The œdema was equally distributed, and the deformed band resembled an everted ventricle. The subsidence of the œdema consumed more than a month.

II. In a laundress, forty-eight years of age, the œdema likewise involved the left vocal band. Subsidence in this case consumed several weeks, and had not been completed when the paper was written; a reddish cyst seemed to have been produced in the centre of the vocal band.

III. Again, in a third case, a worker in bronze, twenty-nine years of age, the œdema occupied the left vocal band.

IV. In one of Cartaz's patients, a groom, the œdema similarly occupied the left vocal band, but subsided much more rapidly than in Natier's cases, having disappeared completely on the third day, although so intense during one twenty-four hours as to have made tracheotomy almost necessary.

V. In a syphilitic woman, thirty years of age, Cartaz noted œdema over the left arytenoid region to the bulk of a small nut (hickory-nut?), resolution of which occurred on the third day.

Leeching and ice-compresses were used in Cartaz's cases; zinc chloride, topically and by inhalation, in Natier's cases.

TOTAL EXTIRPATION OF THE LARYNX WITHOUT PRELIMINARY TRACHEOTOMY.

DR. CH. PERIER reports (*Bull. de l'Académie de Méd.*, July 24, 1893) this case. In January, 1891, a man sixty-two years of age noted the first symp-

toms of what eventually proved to be an epithelioma of the larynx. The operation was performed June 12, 1893, under chloroform anæsthesia as follows: Two transverse incisions from one sterno-mastoid muscle to the other, one immediately below the hyoid bone, and the other a finger's breadth below the cricoid cartilage; a median vertical incision uniting the two others; dissection of the two flaps right and left, scraping scrupulously the external surface of the larynx and trachea; hæmostasis; transfixion of the trachea on each side with a loop of thread to retain control of it after section; insinuation of a grooved director behind the trachea, between its uppermost cartilage and the commencement of the œsophagus. The trachea was then severed with one cut of the bistoury, guided upon the grooved director, and was then immediately drawn upward and forward with the two loops of thread that had been inserted into its walls. A conical canula was then inserted into the trachea. This canula has a projection, around which the threads were immediately secured. Anæsthetization was then continued through the canula and a large rubber tube extending some distance from the body.

The larynx was then removed from below upward, a portion of the uninvolved epiglottis being retained. The mucous membrane of the pharynx was sutured to the upper transverse incision, and the trachea was sutured to the lower one, the canula being permanently removed. Recovery was prompt; the sutures were removed on the eighth day, and at the time of report some satisfactory results had been accomplished with a special form of artificial larynx, the supply of air for which was furnished from without the body by means of a double-bulbed reservoir as for the atomizer.

OBSTETRICS.

UNDER THE CHARGE OF

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ASSISTED BY

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PUERPERAL ECLAMPSIA.

GREEN (*American Journal of Obstetrics*, 1893, No. 1) records the experience of the past eight years in the Boston Lying-in Hospital.

Puerperal eclampsia is believed to occur once in about five hundred pregnancies, and as this hospital cares for about five hundred house patients yearly, eight cases of eclampsia would be its due proportion in the period covered by the report given; that during this time the hospital has received

thirty-six cases, an average of four and a half each year, is due to the fact that eclamptics are often sent to the hospital, who, but for this complication, would be attended in their own homes. In the treatment of ante-partum eclampsia, especially where the attack occurs before the fœtus is viable, the aim of the obstetrician of course is to restore the function of the kidneys without interrupting the pregnancy. The methods adopted in the treatment of ante-partum eclampsia are as follows: Ether is used to control the convulsions. chloral hydrate by the rectum as a nerve sedative between the attacks; morphine is never used. To excite action of the skin, the patient is placed in a hot-air bath, or in mild cases the use about the patient of heated plates rolled in blankets; for drugs, pilocarpine guarded by brandy and other stimulants to avoid depression. Unless the skin responds promptly and in a satisfactory manner, the eliminative action of the bowels is invoked with elaterium or croton oil, aided if necessary, by enema. Digitalis and nitroglycerin are used for their effect on the circulation.

A summary of the results of the writer's success are as follows: In a total of three cases in which the fœtus was non-viable and in which there was no obstetric interference, the maternal mortality was 0 per cent.; fœtal, 33 per cent. In a total of six non-viable cases in which labor was induced, the maternal mortality was 50 per cent., the fœtal of course 100 per cent.

When the eclamptic has reached the period of fœtal viability, there is much less incentive to delay obstetric interference. In the following group of four primiparæ delivery was indicated in the interests of mother and child. In this group 75 per cent. of the maternal cases had a fatal termination, fœtal mortality 50 per cent.

When the eclamptic seizure occurs during labor, it has been the practice of the hospital to deliver as soon as the visiting physician could be summoned. It is not believed that the shock of operative interference under anæsthesia unfavorably affects the nervous system, but on the contrary, that the kidney more quickly recovers its functions after the uterus is emptied. Of inter-partum eclampsia, eight cases are recorded, of these 25 per cent. of the mothers and 25 per cent. of the children died. When the seizure first appears post-partum, the question of obstetric interference naturally does not arise. It may be thought by some that in the presence of symptoms during labor threatening a convulsive seizure it is well to terminate the labor artificially. While such a course is doubtless advisable in lingering labors, it has been the custom of the institution not to interfere when labor is progressing normally. Nervous symptoms are allayed and the kidneys mildly stimulated. Fifteen post-partum cases are recorded, two being twin labors, maternal mortality $6\frac{2}{3}$ per cent., fœtal 12 per cent. Of the latter one died from cerebral hemorrhage on the third day, two were non-viable.

It is thought by the author that post-partum hemorrhage occurs in many eclamptics. Where not severe he has not checked it, as it relieved the blood tension and is favorable to the patient's recovery. Out of the whole thirty-six recorded, twenty-seven mothers were discharged well, nine died, total mortality 25 per cent.

The relation to maternal results of the number of convulsions in any given cases is as follows: The twenty-seven mothers who recovered had from one to twenty-five convulsions respectively; and the nine who died, from two to

twenty-four; or, by averages, those who recovered had five and three-tenths convulsions, and the fatal cases ten and eight-tenths, or more than twice as many. The prognosis, however, in any case, appears to depend more upon the time when the convulsions occur, upon their severity and frequency, upon the length of the labor, the depth of the coma and the degree of kidney insufficiency, than upon the number of convulsions.

CÆSAREAN SECTION FOR OSTEOMALACIA COMPLICATED BY PLACENTA PRÆVIA.

LODEMANN (*Centralblatt für Gynäkologie*, 1893, No. 24) reports the following case: A V-para, thirty-nine years old, one abortion; distinct history of osteomalacia; being for one year unable to walk. By internal examination the outlet was found so contracted that two fingers laid together could not be withdrawn. Other striking deformities existed. The pubes had the typical beak form. Six days after admission pains began, accompanied by some hemorrhage, which persisted several days, finally becoming so severe that the patient became pulseless. The bleeding was finally controlled by tampons.

When examined before operation, the lower borders of the ribs were found to rest upon the iliac crests. The uterus was drawn tightly about the fœtus and reached three fingers' breadth above the umbilicus. Cæsarean section was performed with the help of one assistant. Disinfection accomplished on the external parts with 1 : 1000 sublimate solution, lysol 1 per cent. in the vagina. The uterus being incised longitudinally the fœtus was extracted without difficulty. Hemorrhage was slight. Placenta was found attached in the inferior segment of the uterus and on the posterior wall. The uterine cavity was filled with iodoform gauze and the organ closed over the same by two hands pressed upon it, eight catgut sutures being inserted to secure exact coaptation of the wound borders. Gauze was then withdrawn.

The infant was poorly formed and was dead when born. The puerperal period was favorable; the temperature rising only once; at the same time some odor being noticed in the lochia, an examination was made and a tampon was found to have been left in the vagina. Lysol was used as an antiseptic. Patient recovered. No antiseptic fluids were used in the abdominal cavity, the operation being done on the "dry" antiseptic principle.

A CASE OF SPONTANEOUS RUPTURE OF THE SYMPHYSIS DURING DELIVERY.

OEHLSCHLAGER (*Centralblatt für Gynäkologie*, 1893, No. 24) gives an interesting account of a twenty-years old I-para who came under his care suffering from eclampsia. Albumin was found in the urine, and some œdema was present. Patient had within one year shown symptoms of rhachitis. Forceps being applied to the head high in the pelvis, a somewhat strong traction was made. During the delivery the symphysis ruptured with a distinct sound, and immediately showed a separation of perhaps 3 cm. After this the delivery was easy, and a living child was extracted. The eclampsia did not return. A strong bandage of leather was put around the patient's hips. No fever appeared, and in three weeks she was discharged. When last seen the

two ends of the symphysis were about 1 cm. apart, but this did not interfere with the movements of the woman. The author knows of no similar case either in his own practice nor that of other physicians.

SYMPHYSIOTOMY.

BIDDER (*Centralblatt für Gynäkologie*, 1893, No. 24) reports a case of the above operation done by him in the St. Petersburg Maternity. The patient was eighteen years old, and bore distinct evidences of rhachitis. Diam. trans. 28, diam. cr. 26, sp. 25, cong. ext. 19, cong. diag. $9\frac{1}{2}$ – $9\frac{1}{2}$, cong. vera $7\frac{1}{4}$ – $7\frac{1}{2}$, promontory double. She also had a purulent discharge from the genital organs. Temperature 38.3° C. The child was presenting in the first vertex position and presentation. Section of the pubic joint presented no great difficulty. Some bleeding in the deepest part of the wound was encountered, but was easily controlled by iodoform gauze. The joint after section separated $1\frac{1}{2}$ cm., which increased to 5.5 cm. during extraction of head by forceps. The infant did well notwithstanding a slight degree of asphyxia caused by the cord being around the neck. The left labium near the clitoris contained a broad tear which was repaired by silk stitches. A single binder was used around the hips. Endometritis and a stitch abscess delayed the recovery somewhat, but on the twentieth day an investigation of the symphysis could be made. It was found that the surface contained a furrow, and the two ends of the bones were not entirely united; however, the motion was unimportant, and two weeks later the patient was discharged. The author has a very favorable opinion of the operation.

PINARD (*ibid.*) reported 19 symphysiotomies done by himself and his pupils. All the mothers completely recovered; 16 children lived; 3 died, not, however, directly from the operation. In 10 cases where he had applied the forceps according to the old indications only 1 child lived. To the above 19 operations were added 1 ischio-pubiotomy in an obliquely contracted pelvis, and 1 Porro's operation: result from the whole number, 21 women recovered and 18 children. Sixteen of these women had previously had 30 pregnancies, from which only 2 children lived.

FORCHIER (*ibid.*) operated on a case of generally narrowed pelvis with a conjugate of 11 cm., with a happy result for both mother and child. The writer gives a warning against the indiscriminate use of this operation; the difficulties and dangers should be justly considered. Where infection is to be feared symphysiotomy is completely contra-indicated; yet within necessary limits, he repeats, the operation has a good future.

GUENIOT (*ibid.*) had operated on three cases. The first he had already reported. In the second case he had a rhachitic pelvis of 8.5 cm.; in the third a generally contracted pelvis of 9 cm. Both cases did well as far as the mother was concerned; one child died.

BUDIN (*ibid.*) operated in a case of rhachitic pelvis with a conjugate of 9 cm. The child was in danger. During the operation there was considerable bleeding, which was controlled by compression. The extraction of the child was easily accomplished, but it died in ten days. The woman made a good recovery.

In a case reported by MAYGUIR symphysiotomy was done for dystocia

caused by a periosteal tumor on the left side of the symphysis. Cæsarean section could not be done, and basiotripsy was rendered very difficult by the great narrowing of the pelvis. After separation of the symphysis 6 cm. would make allowable an investigation with forceps. After prolapse of the cord and one hand embryotomy was performed. The anterior vaginal wall was torn 5 cm. in the operation. Patient did well, except for a phlegmasia, until the second day, when she was suddenly was attacked with dyspnœa, and died in ten minutes from blood-clot in the right pulmonary artery. Upon investigation it was found that the symphysis was nowhere united, but the ends of the joint were $2\frac{1}{2}$ cm. from each other.

TEDLIER reported a case with unfortunate termination. The patient was a I-para, twenty-seven years old, with regularly contracted pelvis. Diag. conj. $10\frac{3}{4}$ cm. Symphysiotomy gave a separation of the joint of 5 cm. which increased to 8 cm. during the forceps delivery. Through tearing of the inferior border of the wound considerable hemorrhage was encountered. The perineum, bladder, and urethra were torn. The mother died two hours after delivery from weakness; child lived. He considers symphysiotomy decidedly an operation without harm and for the common good, and that it will supplant craniotomy.

LEPAGE (*Centralblatt für Gynäkologie*, 1893, No. 20) reported the case of a II-para operated on for dystocia caused by a round tumor on the left side of the pelvis. After the operation the delivery was easily accomplished. Silver wire was used to suture the symphysis. Recovery good.

QUENEL cited a case of a V-para of twenty-five years delivered for eclampsia at seven months. Breech presentation. Symphysiotomy was done, and the child delivered, dead, by forceps. Cong. diag. 11 cm.; diam. Baud. 18. The writer believes that in a separation of 2 cm. the forceps can conveniently be applied. In the above case silk was used to suture the pubic joint. The woman recovered. He considers symphysiotomy without danger to the mother.

BRAUN (*Centralblatt für Gynäkologie*, 1893, No. 26) reports an operation on a woman whose pelvic measurements were: sp. 22 cm., cr. 24, tr. 27, cong. ext. $15\frac{1}{2}$, circumference 69, cong. diam. $9\frac{1}{2}$. Child was in an oblique position, the upper extremity and umbilical cord near the os uteri. The conjugata vera was scarcely $7\frac{3}{4}$ cm. The joint after section separated 5 cm. Forceps was applied, and the child extracted without any tearing of the perineum. Silver wire was used to secure the bones. Patient was discharged on the thirteenth day.

A woman, twenty-eight years old, a III-para; all previous children had died during or shortly after birth. The child was presenting by the shoulder with the left hand prolapsed. Uterine tetanus was present. A version was done under chloroform, and was followed by symphysiotomy and extraction. The pelvic measurements were: sp. 24 cm., cr. 28, tr. 31, B. $17\frac{1}{4}$, c.d. 10, cr. $8\frac{1}{4}$. Some injury to the sacro-iliac joint was done. The infant was somewhat asphyxiated when born, but was resuscitated easily. Silver wire was used to suture the symphysis. Six silk sutures and eight stitches were inserted to close the fissure and skin. On the tenth day it was found that the silver wire had been imbedded in the callus. During the puerperium an attack of bronchitis set in accompanied by retention of urine.

The injury to the sacro-iliac joint gave the patient pain, but she recovered without further complications.

The author does not believe the operation should be performed where an endometritis has existed previously to the birth, the danger of septic infection and of abscess, particularly where wounding of the sacro-iliac joint exists, being greatly increased by the discharge. In these cases craniotomy, Cæsarean section, or Porro's operation retain their old place.

WERTHEIM reported the case of a IV-para, twenty-six years old. The head presented. Pelvic measurements were: cr. 8 cm., the transverse diameter much shortened, sp. 23, cr. 25, tr. 28. After section the joint separated $6\frac{1}{2}$ cm. The head was easily extracted by means of Breus' axis-traction forceps. No wounding of the soft parts took place. There was considerable odor to the liquor amnii. This patient died of sepsis on the eleventh day. Section showed an endometritis and thrombo-phlebitis of the right ovarian vein. Death was due to septic infection previous to the operation.

HEMORRHAGIC DIATHESIS OF THE NEWBORN.

SCHAEFFER (*Centralblatt für Gynäkologie*, 1893, No. 22) reports two cases as follows:

The first child died in twenty-eight hours. Post-mortem revealed bacteria, staphylococcus aureus and pyocyaneus, in the spleen, liver, and small intestines, also in the peritoneal and pleural effusions. By cultures the same bacteria were produced. It was supposed that their origin was in a large suppurating (syphilitic) abscess in the uterus.

In the second case a child fed on cow's milk died at the end of three days of typical melæna. An ulcer was found in the duodenum, from which, and also from the spleen, cultures of the bacillus lactis aërogenes were obtained.

HYPERTROPHY OF THE MAMMARY GLANDS.

SCHAEFFER (*Centralblatt für Gynäkologie*, 1893, No. 22) reports a case of hypertrophied mammae in a girl fourteen years old. Amputation was performed. The right breast was found to weigh 3900 gm., the left 3500 gm. The hypertrophy was due to fibrous increase of the gland lobes.

THE PROPHYLAXIS OF BLENNORRHŒA NEONATORUM.

VON ERDBERG, in his inaugural address at Dorpat (*Centralblatt für Gynäkologie*, 1893, No. 24), considers the subject of the various prophylactics against blennorrhœa of the newborn. He is of the same opinion as Von Brunner, that only those cases can be counted blennorrhœal in which the Neisser's gonococcus is found, an opinion which has been attacked lately by different authors. Infection at birth he considers of rare occurrence, and intra-vaginal infection cannot be found. The average time of incubation of the disease was, in his cases, from two to five days, while later appearance of the attack was due to late infection. Notwithstanding the great success of the Credé method and in contrast to many authors, the writer holds that patients coming with symptoms of hyperæmia, swelling

and roughness of the palpebral conjunctiva, in which a sero-purulent secretion is found, present many difficulties in diagnosis to the ophthalmic surgeon. Silver nitrate he does not consider a specific against the disease; it is possible with it to set up an acute traumatic affection. The best fluid for instillation is a sublimate solution of the strength of 1:5000; it produces scarcely any reaction. Fully 75 per cent. of children born need no solution of any kind in their eyes. When the vagina previous to birth has been thoroughly disinfected, distilled water is all that is necessary to drop into the eyes. It might be well, as soon as the head is born, and before the shoulders appear, to carefully cleanse the eyes with a sublimate solution 1:1000, or iodotrichloride 1:4000, using a piece of cotton, and taking care that the eyes are not opened. This method should always be resorted to whenever it has been proven that the mother has gonorrhœa. It has been proven by Oppenheimer that mercuric bichloride in the strength of 1:30,000 is fatal to the life of the gonococcus. The writer includes a number of interesting statistics showing the comparative results of the methods of Credé, Kaltenbach, Küstner, and others.

CHLOROSIS AND POST-PARTUM ANÆMIA.

SCHMIDT (*Centralblatt für Gynäkologie*, 1893, No. 26) in a study of the effects of chlorosis on the female organism during the time of reproduction, relates the following interesting facts. Out of 148 women, 39 gave histories of chlorosis, more or less severe, during their younger years. Great care was taken to exclude all those with doubtful chlorotic histories. Of these 39 cases, the conditions at the time of childbirth were, as regarded health: 3 were in very good condition; 17 good; in 10 the health was sufficiently good for the needs of mother and child, and 9 were in poor state of health. In 30 of the above no traces of the former anæmia could be seen. Those belonging to the class represented by nurse maids, maid servants, etc., who by their mode of life are much in the fresh air and light, with bodily exercise, generally become strong and healthy wives; females of the class who, in the earning of their bread, are compelled to sit all day, later become women of a sad, dejected type.

With a single exception all the patients with early chlorosis could nurse their children.

In 37 cases recorded (three cases twins) the birth occurred spontaneously, once the forceps was applied, for weak pains; in this case there was considerable post-partum hemorrhage. Asphyxia occurred 3 times. No lowering of the contractile power of the uterus from the early chlorosis could be found, which is contrary to the opinion of Winckel. Of the above 39 cases, 41 children were born; twins occurring once, twice the children were macerated, the average weight of 27 of the children was 3277.4 gm. The writer concludes that early chlorosis does not of necessity influence the chances of a woman to have healthy children.

SOCIÉTÉ OBSTÉTRICALE DE FRANCE.

WALLICK (*Répertoire Universel Obstét. et Gynécol.*, 1893, No. 4) considers anatomical rigidity of the uterine neck during labor to be due primarily to

a vice of the dilating agents, rather than a lesion, not demonstrated, of the parts about to be dilated. His histological examination in one case revealed secondary infiltration with bloody serum and œdema due to the compression of the neck and fetal head. The muscular fibres were disassociated thereby, and could not act. The uterine neck broke circularly, and was expelled after twenty-four hours.

GUENOIT (*ibid.*) advises small incisions around the neck in these cases. He sometimes employs a special uterine dilator. He does not regard these incisions as dangerous, and as preferable to section, provided the child is dead. If it be alive use Cæsarean section.

CHAMBRELANT (*ibid.*) narrated some researches on the passage of pathogenic microbes through the placenta, using staphylococcus, streptococcus, and bacterium coli commune. The blood for the cultures was taken at times from the heart-cavities, at times from the kidney and from the nerve centres. From the maternal and from fetal blood identical colonies were obtained. The three microbes traversed the placenta at all periods of gestation, and were found in all tissues of mother and embryo. The size of the bacillus seems to influence the passage through the placenta.

BOUFFE DE SAINT BLAISE (*ibid.*) describes what he believes to be the characteristic anatomical lesion of gravid auto-intoxication, viz., hemorrhagic centres spread in the tissues of the liver, particularly around the suspensory ligament. The microscopic lesions are identical in yellow and in white eclampsia, and consist of fatty degeneration of the hepatic cells around the portal veins and in capillary dilatations. There was also nephritis. He found the same conditions present in all the thirty-one post-mortems made by him.

POROCKI discussed prophylactic drawing down of the anterior foot in incomplete breech presentations. At the Baudelocque clinic this had been practised thirty-three times. These cases are divided into three classes:

1. In 28 cases anterior foot was withdrawn; 28 living children.
2. In 4 cases posterior foot was withdrawn; 3 living children.
3. In 1 case the anterior foot was withdrawn before complete dilatation; the cord came too, and the child was extracted dead two hours later.

Of these 28 cases, 19 were primiparæ. In 11 of these the breech was at or above the superior strait; 6 times it was engaged a little, 11 entirely engaged, and twice the perineum was distended. The size of the infant affected the manœuvre.

Relative to the microbic origin of eclampsia, CHAMBRELANT stated that eclampsia seemed due to poisoning by a toxin, but the presence of a true pathogenic bacillus has not been demonstrated. So far all those discovered have been saprophytes or *B. coli commune*.

HERRGOTT, discussing gastro-intestinal hemorrhage in the newborn, found the cause to be variable: brevity of the cord, or ulcerations of the gastro-intestinal mucous membrane due to fatty degeneration of arterioles; to action of gastric juice or embolism of the arteries of the stomach; in some cases no cause could be found. These cases are rare, 1:1000. In one case the right heart was dilated to excess, and the left rigidly contracted.

BUDIN (*ibid.*) In 76 cases of rachitic pelves with narrowing to 10 cm. at superior strait, there were 5 forceps, 2 versions, 1 embryotomy—70 living infants, all accouchements being spontaneous.

In 28 cases, pelves 5-10 cm., 3 forceps, 2 versions—26 living infants.

In 20 cases, pelves 8-9 cm., 15 accouchements spontaneous, 5 accouchements artificial, 12 forceps, 3 versions—19 living children.

Under 8 cm., 3 living children.

In cases of pelves generally contracted, 2 living children; 1 forceps, 1 version, 1 symphysiotomy.

Total *résumé*: 131 accouchements; maternal mortality 6 per cent.; infantile 8.3 per cent. All the dead infants save one were born spontaneously.

BORAK and BERNHEIM (*ibid.*) report five cases of eclampsia and one of uræmic dyspnœa treated successfully by injections of salt water.

OUL and SABRAZES report a case of post-partum eclampsia in the course of a broncho-pneumonia, nine days after labor. Death in coma in forty-eight hours. Sections of liver showed peri-portal hemorrhages and degeneration of liver cells. Cultures from blood of heart and lungs gave staphylococcus albus and bacterium coli commune.

SYMPHYSIOTOMY FOR CONTRACTED PELVIS. RECOVERY OF MOTHER AND CHILD.

BURNS and ATHERTON report (*Dominion Medical Monthly*, 1893, No. 1) what is presumed to be the first symphysiotomy in the Province of Ontario. The patient was a I-para in her thirty-fourth year, was below middle height, but without deformity. The pelvic measurements appeared by manual examination to be normal, except the conjugate, which was less than three inches. Labor being delayed, an attempt at forceps extraction was made, but proving unsuccessful symphysiotomy was decided on. Section of the pubic joint was accomplished by means of a hernia knife; the ends of the pubic bones separated about two inches during the extraction of the fœtal head, which had to be done with forceps. Some hemorrhage was encountered, but was easily controlled. The perineum was torn to the sphincter, and was at once united by catgut sutures, silkworm-gut being used to close the external wound. The woman, after a slight rise of temperature on the third evening, did well. The fœtal head was found to be large, anterior fontanelle nearly closed.

PURPURA OF THE NEWBORN.

GLENN (*Transactions of the Royal Academy of Medicine*) reports the case of a first child of healthy parents; no history of syphilis, child asphyxiated when born. At birth the infant was covered with discrete hemorrhagic spots, especially on the face, chest, and back. On auscultation a loud bruit was heard over tricuspid area. The child lived thirty-six hours. On post-mortem the spleen was found much enlarged and of a deep red color, weighing forty-five grammes. Liver enlarged, deeply stained with bile and firm to the touch. Kidneys, with the exception of a few superficial hemorrhages, were normal. Stomach and intestines were covered with purpuric spots similar to those on the skin. Both visceral and parietal layers of the pleura were studded with hemorrhages, the same condition being found in the pericardium. Foramen ovale open. All the remaining internal organs were hemorrhagic.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,
OF NEW YORK.

SARCOMA OF THE OVARIES.

THEILHABER (*Münchener med. Wochenschrift*, 1893, No. 28) reports a case of round-celled sarcoma of both ovaries, in a woman aged twenty-four, which developed at the beginning of pregnancy, but was not recognized until a week after the patient had aborted (at the third month). She was not operated upon, but died a fortnight later of pleurisy and pericarditis due to a large sarcomatous nodule in the mediastinum. As the patient had not been under constant observation, it was impossible to determine positively whether the nodule was a primary or secondary growth. Sarcoma of the ovary is quite rare (forming 0.016 per cent. of ovarian neoplasms according to Schröder), and is found most frequently in young subjects. The prognosis after removal is unfavorable.

OBTURATOR HERNIA CONTAINING THE TUBE AND OVARY.

ROGNER-GUSSENTHAL (*Wiener med. Presse*, 1893, No. 26) reports a rare case of incarcerated obturator hernia in a patient sixty-six years old, which terminated fatally on the fifth day after operation. At the autopsy it was found that the hernial sac contained the right broad ligament with the tube and ovary, the uterus being drawn over to the obturator foramen. The condition had probably existed for twenty-six years, the history showing that incarceration had occurred on previous occasions. The event showed that a median incision in Trendelenburg's posture would have been preferable to the inguinal operation which was performed. Only three similar cases have been reported.

ABDOMINAL SECTION IN CASES OF VESICO-VAGINAL FISTULA.

VON DITTEL (*Wiener klin. Wochenschrift*, 1893, No. 25) after reviewing the history of the operation describes his technique in the case of a difficult fistula. With the patient in Trendelenburg's posture, he made a median incision extending from the umbilicus to the symphysis pubis, seized the fundus with a volsella and drew the organ upward and backward. While one assistant elevated the uterus, another pressed the bladder upward and against the symphysis, keeping the organ on the stretch. The vesico-uterine fold of peritoneum was then incised transversely, and the bladder was peeled off (as in abdominal hysterectomy) as low as the portio, until the fistula was thoroughly exposed; the edges of the latter were then denuded, and the opening was closed with fifteen interrupted sutures. The ureters were not disturbed. A drainage-tube was passed through into the vagina, and the abdominal wound was closed with a strip of gauze inserted at its lower angle behind the

sympysis. Recovery was prompt, but in consequence of the obstinacy of the patient the fistula did not close completely.

In order to avoid the danger of urine escaping into the peritoneal cavity, the writer advises that the bladder be empty at the time of the operation. If the uterus is drawn forcibly upward, all the urine will escape *per vaginam*, and in any case the wound can be thoroughly protected with gauze pads. He would only apply the abdominal operation to cases of long standing in which the fistula is inaccessible *per vaginam*.

CONSERVATIVE OPERATIONS ON THE UTERUS AND ADNEXA.

MARTIN (*Deutsche med. Wochenschrift*, 1893, No. 30) reports twenty-seven cases of resection of one ovary after removal of the other, with one death, eight of the patients subsequently becoming pregnant. In forty operations for resection of atretic tubes, after extirpation of the opposite one, he had three deaths, one patient conceiving. Twenty-six patients died in one hundred and forty-one operations for the enucleation of interstitial fibro-myomata of the uterus; there was no death in the last twenty. Two women subsequently conceived.

As the result of his experience, the writer believes that conservative are no more dangerous than radical operations; that the patients are nearly always relieved of their symptoms, while the functions of the preserved organs are maintained, so that pregnancy is possible, while labor is not attended with especial risks.

OVARIOTOMY WITHOUT CHLOROFORM.

LAYEAU (*Annales de Gynécol. et d'Obstét.*, May, 1893) reports a case of double ovariectomy upon a patient who had such serious cardiac trouble that it was deemed unwise to administer an anæsthetic. Local anæsthesia along the line of the incision was maintained by a spray of chloric ether. The writer has demonstrated the possibility of operating in this manner in two other cases of renal and cardiac trouble—one operation being an abdominal hysterectomy, the other a difficult ovariectomy.

TREATMENT OF UTERINE FIBROIDS.

THIS subject seems to be attracting the chief attention of gynecologists at present, judging by the space allotted to it in various society discussions. The following views were expressed at the recent French Surgical Congress:

KÖBERLÉ: Fibroids are essentially benign in character, but may become dangerous in the process of evolution. Tumors impacted in the pelvis constitute a real indication for operative interference. Intra-uterine fibromata, giving rise to excessive hemorrhage, require an operation whatever may be the age of the patient. Large firm tumors which are stationary should not be interfered with, especially if the patient is near the climacteric. An operation is rarely indicated in the case of sub-peritoneal growths attached to the fundus uteri, since they seldom threaten life. In performing hysterectomy, the speaker stated that he had always used clamps in securing the broad ligaments, having first employed them in 1865.

PÉAN: Fibroids are not such benign growths as has been supposed. Sarcomatous degeneration and coexisting epithelioma are to be feared, as well as degenerative changes and resulting septic infection. The dangers of pregnancy in this connection are many and serious. The speaker has noted intestinal obstruction, renal complications, and various abnormal conditions of the adnexa, as well as peritonitis and hemorrhage. In the majority of his cases the tubes and ovaries were found to be diseased. His results were as follows: In two hundred cases of abdominal hysterectomy (1868 to 1893), his mortality was 15 per cent., in fifty combined operations 2 per cent., while in three hundred vaginal hysterectomies for fibroid tumors (performed between 1882 and 1893) the mortality was only 2 per cent. The speaker attributes much of his success to the use of clamps and removal of the tumor piecemeal.

BOUILLY: Hemorrhage and pain are indications for castration, since disease of the adnexa exaggerates most of the symptoms due to the presence of the tumor. In the speaker's experience, pain and hemorrhage ceased in 70 per cent. of the patients upon whom he operated.

POZZI: Vaginal hysterectomy is preferable to castration; the latter operation should be reserved for cases in which the patient is too weak to submit to total extirpation, or where the tumor is very large and is within the folds of the broad ligament. Removal of the adnexa does not eliminate pressure symptoms.

CONDAMIN recommends intra-uterine applications of chloride of zinc in the case of fibroids which cause hemorrhage only, when the patient is near the menopause, or is too weak to undergo an operation. Cauterization gives more permanent results than curettage. Stenosis of the cervix is avoided by dilating thoroughly, introducing a pencil of zinc into the uterine cavity, and then tamponing the cervix tightly with gauze.

DELAGÉNIÈRE: Abdominal hysterectomy should be elected in the case of all tumors that extend to the umbilicus, while castration is preferable for small tumors in young women, when hemorrhage is the principal symptom. Small submucous fibroids may be enucleated; vaginal hysterectomy should, however be preferred if the uterine cavity is deep and irregular and difficult to drain. In all other cases total abdominal hysterectomy is indicated.

CHRONIC OÖPHORITIS.

WINTERNITZ (abstract of monograph in *Centralblatt für Gynäkologie*, 1893, No. 31) gives the results of his studies on this subject, extending over a period of ten years at the Tübingen clinic, where he estimates the affection as comprising ten and one-half per cent. of all gynecological cases.

As regards etiology, he finds that the principal factors are injuries during menstruation, puerperal troubles, gonorrhœa, masturbation, and infectious diseases.

The following anatomical changes were noted: Thickening of the cortex with connective-tissue hyperplasia of the parenchyma, disappearance of the follicles, hyaline degeneration of the intima of the vessels, or obliterating endarteritis. Round-cell infiltration was rarely present as in true inflammation of the ovary.

As regards palliative treatment, improvement is rarely, a cure almost

never obtained. Oöphorectomy, however, should be regarded as the last resort, and is indicated only in cases of excessive menorrhagia, or rarely in those patients who have been treated for a long time without benefit, and "when nervous symptoms are absent."

THE BURIED WIRE SUTURE IN CÆLIOTOMY.

SCHEDE (abstract of monograph in *Centralblatt für Gynäkologie*, 1893, No. 31) has buried his wire sutures in 151 cœliotomies, in the majority of which there was risk of the subsequent development of ventral hernia. Small herniæ occurred in only seven cases, in which it was necessary to remove the wires prematurely on account of pain or mural abscesses. His technique is as follows: Strong silver-wire sutures are first passed through the entire thickness of the abdominal wall, but are not twisted. While an assistant approximates the edges of the wound, the operator introduces three or four silver sutures through the sheath of the rectus and the peritoneum only. While the fascial edges are approximated with forceps, the latter sutures are twisted, then the deep sutures. A small strip of gauze is applied over the external wound, and covered with cotton saturated with collodion. The deep sutures are removed on the tenth day and the patient is allowed to go about without an abdominal bandage.

VAGINO-FIXATION OF THE UTERUS.

MACKENRODT (*Centralblatt für Gynäkologie*, 1893, No. 29) refers to the fact that Winter recently reported fourteen cases of vagino-fixation performed according to his (Mackenrodt's) method, all of which were unsuccessful, and attributes the bad result to wrong technique. The writer insists upon the importance of the following steps: A median incision is first made in the anterior vaginal wall, extending from the portio to the most prominent part of the urethro-vaginal septum, and the flaps are dissected off laterally. The cervix is then grasped with the bullet forceps and is drawn forcibly downward, while the urethral prominence is drawn upward. The bladder is dissected away from the uterus as high as the vesico-uterine fold of peritoneum. The vaginal flaps are now held apart, and a curved transverse incision is made in the vesico-vaginal septum at the lower angle of the wound. A sound is passed into the uterus, and the organ is anteverted, the peritoneum being stripped from the fundus of the bladder sufficiently. The raw surface on the protruding portion of the bladder is now closed with a continuous suture, not only to check oozing and to prevent the formation of a pocket between the uterus, vagina, and bladder, but to approximate the point of fixation of the fundus uteri to the symphysis. If prolapsus exists, the vagina is narrowed by excising the flaps made, and suturing. The final step in the operation consists in fixing the fundus uteri by passing two silk sutures first through the outer edges of the vaginal wound just below the urethral prominence, then into the corpus uteri as high up as possible, and the vesico-uterine pouch, then downward across the vaginal wound so as to emerge at a point an inch lower on the opposite side. The sutures being tied, form a cross. The remainder of the vaginal wound is then closed with catgut sutures, and is at the same time united to the cervix. The silk sutures are left *in situ* from six to eight weeks. The

fixation of the uterus is obtained through union of the opposed folds of the vesico-uterine pouch. Slight flexion of the uterus is maintained by the crossing of the sutures. If the cervix is very long, it is amputated.

The writer has performed this operation thirty-one times; thirteen cases were entirely successful, three women subsequently becoming pregnant, one twice. Six women in all afterward became pregnant; three were delivered spontaneously and one with forceps, the uterus remaining in the former position after involution had taken place.

DÜHRSEN (*Centralblatt für Gynäkologie*, 1893, No. 30) in a lengthy paper discusses Mackenrodt's operation, which, he says, is essentially the same as the one previously described by himself, with the exception of the first step—splitting the anterior vaginal wall—which is superfluous, as well as suturing the lower portion of the bladder and attaching the vaginal flaps to the cervix. Moreover, there is the risk not only of wounding the bladder and causing a fistula or of actually contracting the viscus, but of forming a dangerous pocket between the bladder and the vagina. In his own operation (which can be completed in from ten to fifteen minutes) the writer simply opens the anterior fornix, pushes the bladder toward the symphysis with catheter and forefinger, while the cervix uteri is drawn downward and backward, and by means of temporary sutures gradually draws down the uterus until permanent sutures can be passed through the vesico-uterine pouch and fundus. The patient need be kept in bed only a week. This operation he has performed forty times with perfect success.

STEINBÜCHEL (*Centralblatt für Gynäkologie*, 1893, No. 31) reports four cases of vagino-fixation, performed according to Mackenrodt's method, the results of which were quite satisfactory. The operation was modified by prolonging the median vaginal incision downward, and making an oval denudation when the vagina was much relaxed. Moreover, the peritoneum was dissected away from the fundus as far as possible, so that the sutures could be passed into it higher up. When these were fastened to the lower edges of the vaginal wound, prolapse of the bladder was prevented, and the uterus was firmly fixed in the desired position. Additional sutures were then passed through the uterus, thus bringing the anterior raw surface of the organ more directly in contact with the vaginal wound than in the original operation.

THE PALLIATIVE TREATMENT OF CARCINOMA OF THE CERVIX UTERI.

SÄNGER (*Schmidt's Jahrbuch*, Bd. cexxxvii. p. 88) calls attention to the fact that Carl von Braun, before the days of total extirpation, succeeded in permanently curing 20 per cent. of his cases by amputating the cervix with the galvano-cautery loop, while Winter has shown that the results after extirpation are only 5 per cent. better. Only one-fourth of the whole number of patients who consult gynecologists are still in an operable condition; in those in which the disease has invaded the vesico-vaginal septum and the peri-uterine tissues palliative treatment alone is justifiable. This consists in curettage followed by cauterization with the Paquelin, and, after the slough has come away, applications of solutions of chloride of zinc (fifty to thirty per cent.). The writer separates the remains of the cervix as high as the peritoneum anteriorly and posteriorly and the bases of the broad ligaments

laterally before removing the diseased tissue, tying any spurting vessels. The cervical canal is thoroughly cauterized. At the end of two weeks the chloride of zinc is applied several times. In one case of inoperable carcinoma thus treated there was no recurrence in nearly three years. In only one case out of five has there been a recurrence.

HEMORRHAGIC NECROSIS OF THE FALLOPIAN TUBE.

SÄNGER (*Centralblatt für Gynäkologie*, 1893, No. 31) describes under this term a comparatively frequent condition in which hemorrhage into the tube occurs as the result of torsion of the pedicle of an ovarian cyst, sometimes also in hernia of the tube. The writer reports a case of double salpingitis in which he performed cœliotomy, finding the left tube so compressed and twisted by surrounding adhesions that the tubal wall was filled with blood-infarcts that had undergone necrosis. There were no thromboses in the veins of the mesosalpinx. Clinically the sudden enlargement of a tube which is known to be the seat of chronic disease, associated with pain and other evidences of peritoneal irritation, but without accompanying fever, should arouse the suspicion that such hemorrhage has taken place.

PRIMARY EPITHELIOMA OF THE FALLOPIAN TUBE.

ROUTIER (*Bull. et Mém. de la Soc. de Chir. de Paris*, 1893, No. 1) reports a case of this rare affection, the specimen being removed by cœliotomy. The tube was enlarged to the size of a coil of small intestine, and had a smooth symmetrical outline. The distal end formed a cyst the size of an orange; the corresponding ovary could not be found. The tube, as well as the cyst, was filled with a thick, fibrinous mass, unlike the contents found in chronic salpingitis. Under the microscope the muscular wall did not appear to be hypertrophied, though the submucosa was thickened and contained large alveoli of connective tissue filled with epithelial cells, some flat and others cylindrical, with multiple nuclei.

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CONTRIBUTION TO THE STUDY OF CEREBRAL SURGERY
BASED ON AN OPERATION FOR THE REMOVAL
OF A TUMOR.

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THE number of reported cases of cerebral surgery is singularly small in comparison with the extent of literature on the subject in the abstract. In a recent article describing three fatal cases, McBurney and Starr state that they have been able to find reports of only eighty-seven cases in which surgical relief of tumor of the brain has been attempted. When we consider the advance made both in cerebral localization and in surgical technique since the subject was broached, this seems an extremely meagre collection upon which to rely for actual data regarding symptomatology, course, and prognosis of operable growths. That the actual number of cases far exceeds this estimate is beyond question.

It is natural that cases resulting unfavorably should not be reported with such enthusiasm as the successful ones; but it seems the duty of the practitioner to report all cases, both successful and unsuccessful, in so important a branch of medicine and surgery as this, limited as actual experience must of necessity be—first because operable tumors are of comparative rarity, and secondly because of the reluctance on the part of the patient or his family to submit to an operation of this magnitude;

to say nothing of the hesitation on the part of the practitioner to advise this step except where absolutely sure of his ground. That there is much uncertainty in connection with this subject, even at the best, is evident when we realize that the most marked focal symptoms, including local spasm and paralysis, may be present without demonstrable lesion in the locality indicated by such symptoms, and conversely that the motor tract may be invaded by a gross lesion, apparently sufficient to have produced both irritation and destruction, without giving a clue during life to its seat, or even existence. Not that these exceptional cases detract in any degree from the established facts regarding cerebral localization, which are now too firmly fixed to admit of question, but practically their remembrance cannot but serve to temper the zeal both of the neurologist and the surgeon.

As an example of the former type of uncertainty in cerebral localization, we would mention a case occurring in the Massachusetts General Hospital, where an abscess had been opened in the temporal lobe, resulting from extension of ear disease. A few days later localized spasms suddenly appeared, limited to the hand of the opposite side, and accompanied by corresponding weakness. Metastatic process was at once diagnosed, and a new opening was made over the hand centre, with an absolutely negative result, beyond a rather free serous discharge. Post-mortem examination revealed nothing definite beyond the temporal abscess. Such cases detract in no degree from the accuracy of our knowledge regarding the hand centre, nor should they deter us from making at least an exploratory excision over the hand area; they do show, however, conclusively, that distant lesions may set up an irritability of motor centres—an element always to be borne in mind when we are tempted to assure the family of success in a given case.

Each reported case, successful or unsuccessful, adds something to our stock of knowledge in this by no means exhausted field.

The percentage given by the writers above alluded to (*THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, vol. cv. No. 252) both of success in finding the tumor and of recovery after removal, is probably larger than it would be if all unsuccessful operations were faithfully reported; but even making due allowance for this probability, we have left a result sufficiently gratifying to mark a most important era in surgery and neurology—by no means less important from the point of view of the patient and the practitioner than of medical science in the abstract, in that it offers at least a hope of relief in one of the most serious of ills to which humanity is subject.

The patient whose case we have to report—T. B., of Springfield, aged forty years, married—was under the care of Dr. C. P. Hooker, of that city, who first called Dr. Walton to see the case on February 22, 1892.

The history was as follows: He had been subject for some time to

occasional attacks of headache of brief duration, and at times found difficulty in expressing himself. At first these attacks occurred only at intervals of two weeks, then of a week, then of only a few days. This was about the frequency when he first consulted Dr. Hooker, about a month ago. The attacks had now increased in intensity and frequency, so that the pain was almost unbearable, and he had had as many as two in an hour. The pain was rather worse at night. A fortnight previously he had seen double, the images being horizontally placed. Of late a red spot had appeared in the field of vision, situated somewhat to the left. There was considerable photophobia—worse on the left. He had had no trouble in understanding what people said, as regards the words, but had been unable at times to connect the idea with the word, both spoken and written. For example, he did not realize the meaning of the word "Blaine" (word-deafness); and, again, could not tell whether the number 3650 on a box corresponded to 3650 on a shelf (mind-blindness). He kept saying "barrel of lead" for "loaf of bread," though he knew what he wanted (ataxic aphasia). His previous health was good; his family history negative.

Physical examination showed a large, well-developed man. The pulse was 64, full and soft. The gait was normal; there was no paralysis of motion or sensation. The pupils were alike and reacted to light. There was paresis of the abducens oculi on the left. The patient spoke slowly, and occasionally misplaced words, always correcting himself, however. During an attack of pain the pulse dropped to 48. There was homonomous restriction of the field of vision on the right (hemianopsia) falling short of the median line.

The acuity of vision was unaffected. The fundus showed a haziness which suggested commencing optic neuritis, though the edges of the nerve were distinct and there were no hemorrhages.

It was decided best to postpone operation long enough to give specific treatment a full trial, though nothing in the history indicated this etiology. (The event proved that the new growth was not of specific nature).

This treatment was faithfully carried out by Dr. Hooker during the next few weeks. Three days after Dr. Walton's visit he was taking 95 grains of potassium iodide *per diem*. At this time the left pupil seemed slightly larger than the right, and reacted sluggishly to light.

One week later Dr. Hooker wrote:

SPRINGFIELD, March 1, 1892.

DEAR DOCTOR: Concerning B., headache so intense that he requires morphine, gr. $\frac{1}{4}$, with atropine, gr. $\frac{1}{150}$, every morning and night. Before use of morphine the pain was constant and severe, with half-hourly exacerbations. At this time; pulse 40 and skin bathed in sweat. Pain localized more in left occipital region, near median line, just above protuberance. Ataxic aphasia much more marked; hardly utters a sentence without mispronouncing one or more words or substituting some word which sometimes makes sense, more often does not. Difficult to understand him. Appetite indifferent. Vomits three or four times a day—no connection with taking food. The vomiting seems more like regurgitation, and is often copious—for example, half a chamberpotful. No paralysis except of sixth. Diplopia marked to-day. Think his mind is a trifle cloudy. Potassium iodide, gr. 110, to-day. I do not think potassium iodide has anything to do with his symptoms. Thought possibly morphine might make him a trifle dull. The nausea is not such as we see with morphine.

Will write again this week and give you result of ophthalmoscopic examination.

Yours in haste,

C. P. HOOKER.

Three days later he wrote as follows :

SPRINGFIELD, March 4, 1892.

DEAR DOCTOR: Yours of the 3d received. Dr. Morgan examined B.'s eyes yesterday—finding double optic neuritis. The nerve is not visible in either eye and is swollen fully $3\frac{1}{2}$ D. There are multiple hemorrhages. The pain is more occipital than ever. All the symptoms seem more intensified. He is weaker and confined to his bed. Night before last I made a minute of some of his errors of speech. Notice the fact that in nearly every one the letter L is either omitted or unnecessarily put in: *Glood for gruel; bleefsteak for beefsteak; expain for explain; mate for late; sweeping for sleeping; speak for sleep*. He attempted to say *first-rate*, said *first-nete*, noticed his error and in attempting to correct it said *first-nice*—this seemed to satisfy him. Mrs. B. made an error in giving him the iodide, so he has not taken as much as I thought he had; however, he will take 165 grains to-day. He cannot take it in milk, but bears it well in seltzer water. Think they would sanction an operation if I said so, but I am of the opinion that he is past all medical or surgical aid. I am using from $\frac{1}{2}$ to $\frac{3}{4}$ gr. of morphine in twenty-four hours, to control his pain.

Sincerely yours,

C. P. H.

Two weeks later Dr. Hooker wrote that his sight was decidedly worse and that it was very difficult for him to express himself. His general condition was more unfavorable, and he vomited nearly everything ingested. At this time he was taking 210 grains of the iodide *per diem*. He complained also of vertigo, and it was hard to make him answer questions. He had failed that day more than on any three previous days. On the following day a consultation with Dr. Richardson was held, and operation decided to be imperative.

His condition before operation was as follows :

He lies in bed quiet; hiccoughs from time to time; subsultus is present. Complains of pain behind the left ear. He has lost flesh and strength decidedly. The double vision is so troublesome that he keeps the left eye closed. Aphasia is marked. Calls pain, "eye." Pulse, 100; temperature, 99.3° . Tongue normal. When he tries to speak a long sentence it becomes practically unintelligible. The knee-jerk is absent on both sides.

It was decided that we had to do with a rather large tumor on the left side, of unknown nature and origin, seated posteriorly to the motor tract, involving either directly or by pressure the occipital lobe (affection of vision), the angular gyrus (mind-blindness), the posterior part of the temporal lobe (word-deafness), and possibly the island of Reil (aphasia). The paralysis of the sixth nerve was considered due to pressure downward, not to direct involvement of its course at the base of the brain. This is a not infrequent symptom in large growths, on account of the long course of this nerve over bony prominences; moreover, the post-mortem examination justified this conclusion. It was considered on the whole best to include the angular gyrus and occipital lobe in the exploration, on account of the prominence of ocular symptoms, hemianopsia, mind-blindness, and red spots in the field of vision. The two latter pointed to cortical irritation in the region of the angular gyrus, or to association fibres passing to it, and made it probable that the hemianopsia resulted directly from injury to the occipital lobe or optic radiations rather than from pressure upon the optic tract.

Operation. The operation was performed at the patient's house by Dr. Richardson; Drs. Hooker and Herrick, of Springfield, Dr. Mumford, of Boston, and Dr. Swasey, of New York, assisting. Dr. Walton was present and advised regarding the various steps of the operation.

Previous to the operation the head had been shaved and the skin rendered as thoroughly aseptic as possible by soap, prolonged mechanical cleansing, and bichloride poulticing. The patient took ether well. A crescentic incision was made over the area decided upon, the convexity upward and backward, the diameter of the space involved being about three inches. The bleeding was profuse, but easily controlled by catch forceps. The skull was exposed and the periosteum turned back. With a three-quarter-inch trephine the cranial cavity was opened behind and below the parietal eminence, about two inches behind the fissure of Rolando. This opening was enlarged forward and upward with rongeur forceps. The dura mater was tense, bulging, and non-pulsating. There was nothing remarkable about its color. A flap was turned back in the usual manner, upon which there was a striking protrusion and eversion of the cortex that indicated extreme pressure from within. The everted brain substance was apparently granular in character.

There was very considerable hemorrhage, which was with difficulty controlled by the gauze tampon and numerous ligatures. The operator then introduced the finger readily into the cranial cavity. All parts within a radius of three inches were thoroughly explored, but no definite tumor boundaries were detected, nor did any induration appear, the peculiarly altered brain substance and the extreme pressure only pointing to the presence of the tumor below. (This brain substance proved on autopsy to be commencing new growth of similar character, though of less density, than the underlying tumor proper.) Further enlargement of the opening in the skull was considered, but was abandoned owing to the everted brain overlapping the already exposed edges, with the probable extent of the proposed operation, the presumably large size and deep seat of the tumor, and the very alarming condition of the patient. Under these circumstances, after consultation, it was thought best to abandon further exploration.

The question of removing the cerebral hernia was considered, but this was thought unnecessary.

The flap of dura was replaced as far as possible, and the skin was easily brought into its proper position and secured with six interrupted silver wire stitches. Provision for drainage of the very considerable hemorrhagic oozing was made by iodoform gauze wicking, and a large absorbent dressing was applied.

The patient was put to bed, and after being stimulated rallied quickly, and completely recovered from the ether in a few hours.

On the following day Dr. Hooker writes:

SPRINGFIELD, March 11, 1892.

DEAR DOCTOR: B. is in good condition. Temperature, 99°; pulse, 90-132, steady. There has been no vomiting or attempt to vomit since the operation. Aphasic symptoms are much exaggerated, except when first spoken to; then he is coherent for a few moments. Eyes look more normal and he does not close the left eye when speaking, as he has for weeks. The subsultus was noticed this morning for the first time since operation. The bandages have not stained through, and there are no signs of suppuration.

Aside from his rapid pulse and increased aphasia, he is more comfortable than before operation.

Yours truly,
C. P. HOOKER.

Three days after operation Dr. Hooker writes:

SPRINGFIELD, March 13, 1892.

DEAR DOCTOR: Our patient, B., is in a decidedly comfortable condition. There has been absolutely no rise of temperature since the operation; the dressings remain intact, without showing a stain of oozing; his mind is clear, or nearly so; the aphasia, very marked for three days after operation, is now better than before, and he writes his name characteristically and legibly. His vision is better, and there is no complaint of diplopia.

Certain it is that the operation was successful in a palliative way, if in no other. There is no pain except such as comes from the pressure of the tight head bandage. I keep him under morphine, but have not increased the dose—half a grain twice daily.

I shall remove the dressings in a few days.

Yours sincerely, C. P. HOOKER.

The following letters were received regarding the condition from this time until the death of the patient:

SPRINGFIELD, March 24, 1892.

DEAR DOCTOR: B's condition still remains favorable, and he is very cheerful and happy. The aphasia, while noticeable, is, by a comparatively easy effort, corrected. He has complained of a slight pain on the right side, in the parietal region, just above the squamous portion of the temporal, I should judge. He was inclined, a few days ago, to be babyish, but that has passed away. His mind is not as clear as before, but I think it is improving. I dressed the head yesterday, and there was no pus. The tumor under the scalp is four inches in its longest diameter, three and a half inches in its shortest, and projects from the skull about three-quarters of an inch. Its contour is as convex as a half-orange. There is a slight oozing from the drainage-tube, which I removed and cleaned in peroxide, that seems to be broken-down brain matter. Its consistency is about like that of laudable pus; its color a muddy pink, *i. e.*, slaty pink; quantity about two drachms in six days. The extruded brain which I mentioned is flattened and shrunken. One opening, about the size of a buckshot, remained when the gauze was inserted. Morphine, half a grain once daily.

I enclose a sample of his writing, done this morning while in a semi-recumbent attitude, twisting the body for light, the paper held on a book.

I think the vision very much impaired, for he does not seem to be able to see ordinary large type. Perhaps he has an inability to comprehend the significance of written or printed characters (?). It is a remarkable case, and the operation was justifiable if for no other reason than that it gave him such great relief and prolonged existence.

Yours truly,
C. P. HOOKER.

SPRINGFIELD, March 28, 1892.

DEAR DOCTOR: B.'s condition is not quite so favorable, though there are no special developments. The temperature went up to 100 last night, so I removed the dressing. I found the tumor not enlarged—if anything slightly smaller; marked pulsation throughout; portion around drainage-tube covered with thin layer of pus; pus also exuding from the tube. I removed the tube and syringed with peroxide. The place where gauze was inserted shows ragged brain tissue, flattened to the level of the scalp and disintegrating. The aphasia, while it is very apparent, is corrected with comparative ease. No pain or tenderness. No diplopia. Vision is very feeble, however. I think his mind is somewhat dull. He sits up daily and is able to walk about. His appetite is good. Bowels act with salines. One peculiarity is that he has no

conception of the meaning of figures. When asked his age (his birthday comes the 29th), he said he was fourteen.

He has gained in flesh, looks fairly well, and is very cheerful.

Yours truly,

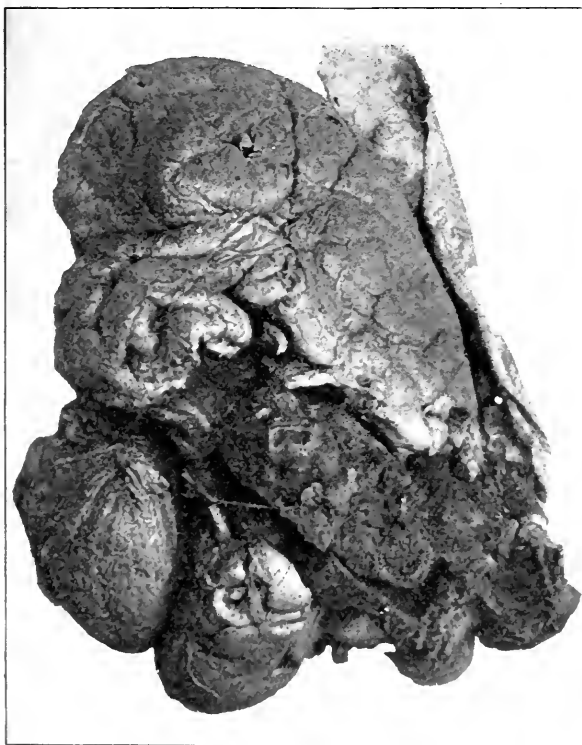
C. P. HOOKER.

SPRINGFIELD. April 6th, 1892.

DEAR DOCTOR: Our patient, B., is on the down grade. March 26th seems to mark the day when his bad symptoms developed. He has steadily lost ground since then, though he is by no means in such a desperate condition as he was the morning of operation. I should think that, unless some unforeseen complication arises, he might live a month or more. He is dense, and the aphasia is very marked, so marked that at times it is not possible to comprehend him. Again, by ingenious guessing, one can make out his meaning. He is discouraged and fearful—threatening to terminate his existence for fear of the loss of his reason. There is slight incoördination in the movements of the right arm, and the hand-grasp of the right is distinctly weaker than that of the left. The cicatrix is gradually stretching apart, and the brain tumor is increasing. There is free suppuration—so free that a daily dressing is required. Notwithstanding, the temperature has never been over 100°, and is normal to-day—never has reached 100° but once. I syringe the wound with peroxide, and keep on a sublimate dressing. I could not possibly keep the wound aseptic.

Yours sincerely,

C. P. HOOKER.



The patient died on April 23d—fifty-one days after operation.

The autopsy showed a more or less lobulated, pear-shaped mass occupying the region of the posterior parietal and anterior part of the occipital

lobe on the left side, lying quite loosely attached. The growth penetrated nearly to the mesial surface of the brain. The temporal lobe seems to have been pushed downward and the occipital lobe backward by the growth. Its consistency was somewhat firmer than that of the brain substance, was easily distinguishable from it, in places being separated by a narrow fissure; at other places, especially at the vertex, running gradually into the brain substance, so that entire enucleation of the growth would have been impossible. The edges of brain surrounding it were ragged, and evidently infiltrated with a new growth.

Microscopic examination showed it to be a highly vascularized round-cell growth, with a large amount of very finely fibrillated intercellular substance. Diagnosis, glioma. (Dr. W. F. Whitney.)

REMARKS.—The pathological findings in the case demonstrate the practical accuracy of the localization—namely, that the bulk of pressure was in the region of the angular gyrus and involving the occipital lobe. The immunity of the speech centre from actual new growth justifies the conclusion that the aphasia was the result of pressure, or of affection of the association fibres and sensory factors necessary to speech, or to both, rather than to implication of the speech centre. The mind-deafness was due to the involvement of the posterior part of the temporal lobes. It will be seen by the accompanying cut that the temporal lobes were somewhat twisted by the pressure, so that the fissures became more nearly vertical than horizontal. The fissure of Sylvius was also pressed forward so as to become more vertical than is normal. The motor centres were practically intact, as was to have been expected. The tumor was apparently of very rapid growth, and, large as it was at the time of operation, it was much larger at the time of death. It had doubtless also pressed toward the surface, partly by natural growth, and partly on account of lessened resistance in that direction. Dr. Whitney states that a piece of the cortex removed at the operation, and given him for examination, showed much the same structure microscopically as the tumor, though less dense. It is possible, therefore, that the tumor proper eluded the touch of the operator partly by the deep situation of the portion directly under the point of operation, and partly on account of the very slight difference in its consistency from that of the protruding brain. In a similar case, on such a marked protrusion of brain, the writers would be inclined to enlarge the opening indefinitely, to explore further, and remove everything possible, for the absolute hopelessness of expectant treatment being apparent, it would seem wise to give the patient the benefit of an exhaustive search, even in spite of the dangers of the operation.

The difficulty in using the rongeur forceps to enlarge the opening in the skull after the dura mater was opened and the brain literally pouring out, would lead us in another case, where so great evidence of pressure existed, to enlarge the opening, before cutting the dura mater, to the

fullest extent likely to be required. The disadvantage in this procedure is the uncertainty in which direction to extend the opening, a disadvantage which is more than counterbalanced by the increased facility in operating, especially as it is a matter of comparatively little moment if the opening proves somewhat larger than necessary—a most improbable situation in any event. The plan of cutting out a semicircle of bone and reflecting skull and skin together, breaking the lower edge for the purpose, certainly offers the advantage of sufficient room for exploration, but has not recommended itself to the writers as necessarily more practicable than the old method of trephining and enlarging. In the first place, we feel safer with the bone removed than replaced, even when replaced under the most favorable circumstances.

The absence of even larger pieces of bone, though apparently disadvantageous, has been proved by experience to detract in no material way either from the patient's comfort or safety, whereas replaced bone is always a possible source of future trouble.

With regard to the hemianopsia, it seems probable that its origin was central, as supposed, *i. e.*, due to involvement of the occipital lobes and optic radiations. The optic tracts themselves were apparently intact. A noticeable feature shown by the fields is an homonomous retraction, alike in both eyes, but not reaching the middle line. This form of hemianopsia is less common than complete hemianopsia, or even loss of a quadrant, but has been already observed.

The subsequent history of the case would seem to justify leaving the protruding brain untouched, for its presence certainly affected in no way unfavorably the progress of the case, which was certainly remarkable, the relief of pressure symptoms alone justifying operation.

RECENT INVESTIGATIONS IN FARADIC ELECTRICITY: VARIATION AND CONTROL OF THE CURRENT BY RAPIDITY OF INTERRUPTION AND VARIATION OF COILS, AND THE SINGLE-WIRE HIGH-TENSION CURRENT.

BY GEORGE J. ENGELMANN, M.D.,
OF ST. LOUIS.

I HAVE been for years more or less interested in the therapeutic development of faradic electricity, but have as yet made no public mention of the interesting results achieved; hence it is with pleasure that I can now not only present a *résumé* of my investigations and experiments, but can demonstrate the practical results accruing therefrom—the new faradic apparatus—together with some of the novel

physical and physiological results obtained thereby. With safety I may say that the therapeutic usefulness and adaptability of faradic electricity has been largely increased by the widely extended range and the controllability of interruption, and the defining and precisising of the various secondary coils, as evolved by experiment directed toward the precisising and controlling of the faradic current; the essential features from which all has branched being the rapidity of interruption and the character of the secondary coil. But whatever may have been achieved, and all that I can now show, although new in form, is merely a developing and perfecting of principles laid down in my first paper on "Electricity in Gynecology," read before the American Gynecological Society at its Baltimore meeting in 1886, and of axioms then outlined and clinically demonstrated. In that paper I called attention, first, to the importance of the variability of interruption and the determining of these interruptions; secondly, to the importance of differently constructed secondary coils as necessities for the variation and perfect control of the therapeutic effects of faradism; and thirdly, to the necessity of precision in all the essential details for purposes of record, dosage, and comparison. I sought, in respect to faradic electricity, the same precision and possibility of record and dosage that had so rapidly advanced galvanism in professional favor as a therapeutic agent; and I believe that the points at that time aimed at have now been achieved, and that satisfactory results may be confidently looked for.

With the introduction of the galvanometer the constant current made rapid progress, but it is only within recent times that attention has again been given to faradic electricity, and such progress as has been made has been precisely in the lines mapped out in the paper above referred to. This will be better explained by giving an outline of the status of galvanic electricity then and now. It was not many years ago (at Baltimore in 1886), that I vainly attempted to procure a galvanometer in the city named for the purpose of demonstrating its use in therapeutic applications. Such an instrument could not be obtained until my esteemed friend, Dr. Wilson, by aid of the telegraph, succeeded in securing one from Mr. Fleming, in Philadelphia. It is probable that hardly a milliampèremeter was in use at the time; the galvanic current was vaguely and crudely applied. Now it has become an exact and well-defined agent of known therapeutic value. It was the galvanometer—the guide to precision, to dosage and record—which gave to galvanism its impetus and the confidence of the profession; and it is this precision, this possibility of record and dosage, which is needed to place faradism upon its proper basis.

But what was the status of the more variable sister to the continuous current, the more intangible induced, or faradic, at that time? Then, and for years thereafter—until Messrs. Waite & Bartlett produced a

battery in accord with the suggestions made in that very paper toward the greater variation of interruption and coils—the ordinary sharp-current instrument with a single coil and a practically non-variable interruptor held sway and was used throughout. We must, of course, except the Tripier instrument made by Gaiffé, which, however, was used only by a few specialists, and was almost wholly confined to scientific laboratory experiments; and the Rockwell instrument, made by Kidder, with a secondary coil of different sized and lengthened wire, wound on one and the same spool and tapped so as to be used either singly or in series. This was the pioneer instrument in this country, and certainly the best. Such was what was known as “faradic electricity” in electrotherapeutics when I outlined what I deemed the essentials for progress, the very principles upon which the instrument now perfected is based. These principles I will quote from the paper already referred to:

“The effect of the current varies with the number of interruptions and with the nature of the helix, . . . with the length and thickness of the wire forming the secondary coil. . . . Sedative effects are best attained by the utmost frequency of interruption, and muscular effects by slow interruption. . . . A current of feeble tension and greater quality as developed by the short coil of thick wire has the best contractile effect on the muscle, and a current from a long coil of fine wire, a current of higher tension and less quantity, affects the muscle less and the nerve more.”

To all this I still adhere, and I am gratified to see that these principles are gaining ground and are bringing faradic electricity to the front, as is evident from the demand for improved instruments and the more general manufacture and use of instruments with well-regulated coils and interruptors; yet, while this is a great improvement, more still must be achieved. The best of these instruments, those made for Goelet and Hutchinson by the Galvano-faradic and the Chloride of Silver Battery Co., the Fleming instrument, and the Mackintosh imitation of the Gaiffé, as well as the earlier models of my own instrument made by Waite & Bartlett, approximate to some extent the desired conditions; but they lack the necessary range, precision, and controllability of interruption and coils.

Faradism in its present status is incomplete and unsatisfactory as a therapeutic agent; and as the character, the quality, and the effect of the faradic current, quite contrary to the galvanic, depend entirely upon the producing apparatus, it is this which must be improved. Clinical experience had told me that the rapidity of interruption and the character of the secondary coils were the essential elements, so that I sought to obtain in these factors the utmost range and precision. With such objects in view the new apparatus was constructed; it is the direct result of physical and physiological experiment based upon a knowledge of

clinical needs and therapeutic demands, and substantially proves the correctness of the course pursued and the remarkable variation of current-effect which can be produced.

I here refer to the instrument itself, because, as I have already stated, it is upon the apparatus that the quality and effect of the faradic current depend—unlike the galvanic, which is practically independent of the generator, currents from all sources being about the same.

To give the induction current the necessary range and precision, it proved essential that the instrument be provided with:

1. An adjustable, variable, and recordable interruptor of great range up to 50,000 or 100,000 interruptions per minute, with a motive power separate and distinct from that of the primary inducing flow.

2. A series of secondary coils of definite quantity and electro-motor force, with great range, each adapted to a certain therapeutic purpose.

3. An adjustable core, with scale to determine its position.

4. The possibility of precise record of all details; this means a primary coil of known resistance and electro-motor force proportionate to current strength and secondary coils to be used, and a primary current of known intensity.

I would strongly urge a uniformity of construction for core and primary coil, and uniformity of primary galvanic flow; this would greatly facilitate record and comparison, and could easily be accomplished, as most primary coils are very much alike, and there is no great variation in the galvanic force employed—from 2 to 6 volts and from 600 to 1300 milliampères being generally used; this is readily controlled by rheostat and galvanometer, and brought to the desired average intensity.

The new apparatus is constructed with reference to precision in all details, but it is the interruptor, with motive power separate and distinct, securing interruptions far more rapid than any hitherto obtained, and interruptions determinable in number, together with precisely defined secondary coils, which give the instrument its individuality, and I take pleasure in saying that the satisfactory result which has been achieved is due to the kindly manner in which Messrs. Waite & Bartlett have placed their efficient force and their material at my disposal; while the solving of practical problems, the practical carrying out of my ideas, I owe to Mr. Harry Waite, who has been my constant aid in all experiments made in this city; therapeutic tests being constantly made in my clinic by my assistants, Drs. Ameiss and Temm.

The interruptor. While the rate of vibration or interruption is one of the essential features of faradic electricity, it has hitherto been regarded merely as a necessary mechanical factor for the production of the current, of no therapeutic value whatsoever. Although variability is the very life and essence of faradic electricity, attention has never been directed to the importance of interruption in medical currents. Some vague references

have here and there been made. Gordon, in his *Electricity*, briefly mentions a high-speed interruptor used for experimental purposes, but does not say what those experiments were, and, in fact, lays no further stress upon this fact. Dr. William Scheppegegrell, of New Orleans, in a most progressive publication which has just come to my notice, speaks of a similarly constructed interruptor as adaptable to galvanic and faradic currents, but gives no details as to any peculiarities of current, and makes no especial therapeutic claims for such current. Dr. William Hutchinson is the first to speak of therapeutic effect, and in a paper read before the American Electro-Therapeutical Association in October, 1892, advocates the singing rheotome, claiming interruptions of great rapidity, with astonishing anæsthetic effects; he unfortunately bases his measurements of speed upon aural comparisons with the tuning-fork—giving results which have not been fully borne out by my own investigations—and I may here say that I deem more positive tests of the rate of the interruptions necessary than these, as few possess the delicate ear and the musical training necessary to make these comparisons; but no matter what the speed possible, the rapidity of any vibrator so constructed cannot be controlled within a satisfactory range, nor can the necessary rate of vibration be secured whenever desired; any good features which it may possess are of no avail until it is used with a motive power separate and distinct from that employed for the coils. I deem it of less value for medical purposes, as its rate of interruption depends upon the strength of the therapeutic current to be used; hence rapid interruptions are out of the question where mild currents are to be employed, rapid interruption necessitating strong currents.

I must here express myself more fully upon this point, as I deem the separation of vibrator, or interruptor, from the induction coil itself essential to the development of this form of electricity as a therapeutic agent. Hitherto the interruptor has been regarded as a mere mechanical factor, a mechanical necessity for the production of the induced current, and it has been in no way connected with therapeutic effect; hence it has been a part of the apparatus, and will always be directly connected with it in the average coil for the sake of simplicity of construction and cheapness.

In order to obtain the most satisfactory physiological and therapeutic results from the faradic current, the interruptor must be separate and distinct from the coils and propelled by a distinct motive power, for the following reasons:

Changes in the primary galvanic current are necessary to control the rapidity of interruption, and this must be accomplished without affecting the physiological current from the coils, as changes in the primary flow supplying the coils must be accomplished without affecting the rapidity of interruption—all of which can be done only by employing a separate motive power for each.

For the purpose of properly actuating the vibrator, primary galvanic currents of too great an intensity have been used.

Rapidity of interruption or alternation is a factor of large general importance, too long overlooked, which will yet claim greater attention, both for mechanical and for therapeutic purposes in connection with faradic electricity and with alternators and vibrators of other kinds. Mr. Tesla has demonstrated the marvellous mechanical results of rapid vibration, and D'Arsonval revealed the surprising insensibility of the system to currents of extremely rapid alternation, and also proved their sedative effects. For physical, physiological, and therapeutic purposes, rapidity and variability of interruption and alternation are most important, and if it is true that the effect of the faradic current is mainly due to its mechanical influences upon the molecular constitution of the organism, the great importance of regulating that vibration is evident. That mechanical vibration is potent as a curative agent has been repeatedly proven, first in England, and interest in this subject is at present excited by the experiments of Charcot with the *médecine vibratoire*. Isolated cases have been published. Boudet, of Paris, cured facial neuralgia by the vibrations of a tuning-fork, 200 per second, communicated to a sounding-board upon which was fixed a small rod with ball end, which was placed upon the face at the point of exit of the infra-orbital, thus communicating this vibration to the nerve. After an application of from five to six minutes the pain ceased for a time, and by continuance of the treatment a cure was achieved. In the Salpêtrière a large tuning-fork was used, placed upon an extensive sounding-box, the atmospheric vibrations produced thereby acting as did the rod in the other case, and with similar satisfactory results, even to the restoration of muscular activity in the paralyzed lower arm of a hemi-anæsthetic. Varying rates of vibration have been successfully used by Dr. J. Mount Bleyer, of New York, in the treatment of diseases of the ear, and if there is any truth in the theory of the variation of molecular vibration as determining nerve disease and its cure by corresponding vibrations, the necessity of precisely determining the vibrations used is self-evident.

But it is only to the interruption of the faradic current that I will here refer. The increased rapidity of these interruptions and the ability to control them render the application of effective currents possible to the most sensitive tissues, and give the greatest scope to the efficiency of those currents, especially increasing their sedative powers. The new instrument gives us every variation of interruption; we retain the vibrators as before used upon the Waite & Bartlett battery, but with a separate motive power of, at most, two Gonda cells; there is a single impulse key; the slow vibrator giving us up to 1000 or 1500 interruptions, and the rapid vibrator giving from 1000 to 3000 or 4000. These, of course, cannot be controlled with absolute precision, and precision within such

limits is hardly necessary, but if desired it can be attained by the new instrument, which gives us slow interruptions with absolute precision up to 400 per minute, and all the more rapid interruptions from 3000 to 50,000 and 100,000 per minute can be obtained with a like precision.

The interruptions are obtained from the commutator upon the axle of a small motor, and have been determined in number by the use of the speed indicator, which is compared with the current intensity propelling it, the speed being governed with precision by the current used; hence, after the preliminary experiments the rate of interruption, or the speed of the motor, is indicated either by the galvanometer or, when a red-acid cell or storage battery of known force is used, by the rheostat. This instrument, however, serves not only as a controllable high-speed interruptor for these condary faradic current, but may be used as interruptor or alternator for the primary and for the galvanic current. I will here only speak of it as an interruptor in faradic electricity, and its importance in this capacity will be appreciated after a brief review of some of the physiological experiments made which demonstrate the great variation of effect produced by variation of the rate of interruption.

The effect of faradic electricity, best demonstrated by mild currents, slowly increases with the rapidity of interruption, as observed both upon motor and sensory nerves, up to 2500 or 3000 per minute; then slowly decreases with an increase in the rapidity of interruption. The greater the current strength the greater the number of interruptions necessary to reduce or annul its effect completely, the muscle ceasing to respond before all impression upon the sensory nerve is lost. A moderate current, such as that from coil No. 3 of my battery (Waite & Bartlett) at 45 of the scale, or one-third of the coil in circuit, will produce muscular contractions with from 45 to 100 interruptions per minute; this current grows stronger with an increase in the rapidity of interruptions up to 4000 per minute, then soon decreases. Muscular contraction ceases at 5000, at 6500 its sensory effect is barely noticeable, and before a rapidity of 10,000 is reached it ceases to be felt altogether. A very strong current, such as one from No. 3 coil completely overlapping the primary, with an inducing force of four Leclanché cells, and applied through large moist electrodes—in other words, a current too strong for therapeutic applications with the ordinary vibrator at 3000 per minute, is barely perceptible with 25,000 interruptions per minute, and ceases to be felt altogether at 28,000. The rapidity of interruption controls the physiological effect of the current as perfectly as the sledge movement of the secondary coil, so that, all other conditions remaining unchanged, it is an index of current strength which may well be utilized. The therapeutic value of rapid interruption rests upon our ability to employ strong, efficient currents without discomfort, and is found in the nerve-quieting, sedative effects of these interruptions with fine coil currents.

The coils. Therapeutic use having proved the variable effects produced by coils of different length and thickness of wire, my experiments were made on this basis: that quantity and electro-motor force of current, as determined by resistance or diameter of wire and number of winds were the determining factors, as far as physiological and therapeutic effects of the secondary coil are concerned; and this has been proved correct, but the practical question remained as to the precise conditions under which currents of the greatest therapeutic value were produced, and under what conditions each special effect would best be obtained. Coil upon coil was wound as previous results seemed to indicate, and although still reserving final decision, I should now say that we have at least approximated the physiological and therapeutic extremes. Motor, to the exclusion of sensory effect—that is, painless influencing of the muscle—is most satisfactorily attained by secondary coils of the lowest possible resistance with the largest possible electro-motor force or number of winds: by the heavy-wire coil, with a resistance of 0.7 or 0.8 of an ohm and 500 to 600 winds, of No. 15 wire, and better still by an increase in the electro-motor force by the use of fine wire in multiple—this being a coil of 6500 winds of No. 32 wire, with 4.1 ohms resistance. The opposite condition, that is, the highest possible resistance with the lowest possible electro-motor force, produces the most painful currents as used for purposes of counter-irritation—this is a coil of No. 40 wire, 528 winds, and 180 ohms resistance. The utmost penetration, together with satisfactory general therapeutic effects upon the nerve, is obtained by coils of higher resistance and greater electro-motor force. Thus, a generally serviceable coil is one of from 4000 to 6000 winds and from 250 to 740 ohms resistance; for sedative purposes, for the benumbing or anæsthetic effects, a still higher electro-motor force is necessary, as in a coil of 9000 or even 12,900 winds and 2500 ohms resistance.

To better illustrate what these figures mean, I will say that the longest coils heretofore made for medical instruments have, in the best, been of 3500 to 4000 winds, or 2000 feet, and good vibrators gave 3000 interruptions per minute, or 50 per second.

Such have been the results obtained after careful experimentation with coils of the most various kinds. We have seen that low resistance with high electro-motor force is the coil most effective upon muscle, causing least sensation; and the highest resistance with the lowest electro-motor force is the very opposite—is the most intensely nerve-irritating coil without muscle effect; while the penetrating motor and sensory effects, varied by the character of application, are produced by an increase of both resistance and electro-motor force, sedative effects being best produced by the highest possible electro-motor force. But I believe that a limit is to be placed to this, at least when used in connection with the ordinary bat-

tery force and primary coil, and that this need certainly not exceed 9000 or 10,000 winds.

From all clinical and physiological experiments it is evident that the quantity and electro-motor force of the current, as indicated by resistance and by the number of winds, are the determining factors; hence an instrument can be of value only when these data are given, and given with precision; coils must be accordingly marked, just as the dosage is indicated for any other remedy, and for purposes of record and comparison these points must be referred to. For the sake of comparison, it would be preferable that certain standards should be adopted, yet as this is almost impossible, each manufacturer advocating his own special instruments, these instruments should at least be precise, with definite and clearly indicated qualities.

It would seem needless to insist upon the use of properly constructed coils, such as best serve the purpose intended to be accomplished, and yet attention must be directed to this point, as some still claim all effects from one and the same coil, or from one and the same coil tapped at different points. It is, indeed, true that varying effects can be obtained from one coil by varying the method of application, but by no means so distinctly and so satisfactorily as by a variation of coils; in short, such results are primitive, partial, and incomplete. Each of the coils I have selected answers a definite purpose, best attaining the desired effect without complication by other unnecessary and often deleterious action.

The coil of 4.1 ohms resistance and 6500 winds contracts the muscle thoroughly without influence of any kind upon the nerve, and the coil of 180 ohms resistance and 528 winds produces a painful counter-irritation without any effect upon the deeper tissues; and nothing demonstrates more strikingly the great importance of resistance or diameter of wire upon the physiological effect of the current: this coil gives a painful current and does not in the least affect the muscle, whilst a coil of 0.85 of an ohm resistance and 528 winds gives a current which is hardly appreciated by the sensory nerves, but acts well on muscular fibre; and this striking contrast may be observed with the same number of winds in circuit, or precisely the same electro-motor force. It needs but the testing to prove the necessity of coils so varied for the satisfactory use of faradic electricity in medicine; hitherto it has not been a very useful agent, for the reason that our apparatus has been imperfect and we have lacked the means of developing the most valuable feature of this form of electricity.

Actual galvanometric measurement of the secondary faradic current in micro-coulombs is possible, but is no indication whatsoever of physiological effect, hence useless for the physician and useless for record and dosage. Until greater progress is made we must refer to the following

data in lieu of direct measurement: *a.* Strength of the primary galvanic inducing force. *b.* Character of primary coil. *c.* Position of core. *d.* Number of winds and resistance of secondary coil and its position upon the scale in reference to the primary. *e.* Number of interruptions. *f.* Character and location of electrodes. *g.* Duration of séance. This record is possible only with precise, well-authenticated instruments, and instruments in which the motive power controlling the interruptor is independent of that used for the coils.

In conclusion I may say that by means of this increased rate of interruption and a greater variation in secondary coils, the therapeutic possibilities of faradic electricity have been greatly extended; and by the exact determination of the rate of interruption, with the character and position of the secondary coil—the character of secondary coils being determined by their resistance and the number of winds—comparison, record, and dosage are possible. Not only can we attain a great variety of therapeutic effects by the proper combination of the various essential factors, but as these can all be defined and determined, dosage and record are approximated to such an extent that with instruments properly constructed and precised, satisfactory work will be possible and faradic electricity will assume its proper place as a therapeutic agent.

The single-wire high-tension current is one of the products of the induction coil which is, perhaps, of greater interest experimentally than of value therapeutically, yet I will take the opportunity of demonstrating curious phenomena which have developed from Mr. Harry Waite's suggestion of grounding one pole. The negative pole of the break current being the most intense, this is used, and the positive grounded; a high-tension current is thus obtained, even at quite a distance from the generator; it is similar to the static, and produces some curious effects. This current is more like a pure static than like the so-called static induced.

While there may be little therapeutic use for the high-tension single-wire current, it is nevertheless worthy of trial, and I desire to call attention to it as useful in neuralgic conditions; and applied by the hand of the operator in the various forms of headache and in the giving of massage, marked physiological effects have been observed, but I am not as yet in a position to demonstrate their therapeutic powers.

The mechanical effects are shown by the glow of the incandescent lamp and by the spark, which is like the static; a small electric lamp, such as is used for laryngeal purposes, or a 118-volt incandescent lamp, may be set aglow twenty, thirty, and more yards away from the apparatus, by contact with the negative pole, if the glass bulb of the lamp be held in the hand of the operator, it being indifferent whether or not he be upon an insulated platform; it will likewise glow if he pass the current through

his body, seizing the negative wire in his hand and grasping the metallic base of the lamp in the other, then approximating the glass bulb to some other individual. While this is the carrying of the current by means of a single wire, it is a pure induction effect, and not like those startling results obtained by Mr. Tesla—dependent upon rapidity of vibration, unless it be molecular. The glow will be produced as a momentary flash by single contact; as contact is more rapidly made, as vibration or interruption succeed each other more rapidly, even at from 500 to 1000 per minute, these successive flashes merge into a constant glow, a glow which varies with each individual lamp: in some it follows the carbon filament, or centres upon that part of it nearest the fingers or hand grasping the glass bulb; in others it is independent of the filament, as a diffuse glow, but most frequently more intense toward the grasping fingers. Different lamps of the same voltage act very differently, probably owing to the different conditions of the vacuum—its more or less perfect state; so also is the effect a different one, whether the vibrator of the coil itself is used or whether the separated interruptor is employed, which gives no flash on single contact, either make or break, and does not produce the glow until a rapidity of from 8000 to 10,000 per minute is obtained. This reaches its height at from 10,000 to 15,000 interruptions per minute, decreasing as these grow more rapid. These effects were produced by a red-acid or Grenet cell. Only carefully wound, well-insulated coils can be used, by reason of the extremely high tension of the current—which, on a damp day, will throw a spark of one-third of an inch. The most satisfactory results were obtained from a coil of high electro-motor force, 9000 winds of No. 36 wire; both physical and physiological effects diminished with an increase or decrease of electro-motor force, and are barely noticeable from coils with as few as 4000 winds, or with as many as 13,000.¹

The spark produced in damp weather has quite an effect through high resistance. From the point of a metallic electrode it is painful, and acts intensely upon motor points, but the skin must be very dry. When applied by means of the entire hand, to the forehead, for instance, no sensation is produced, and yet a physiological effect is undoubted, so that this must prove a satisfactory method of therapeutic application, as any degree of sensation can be produced by a lessening of pressure until the surfaces are barely in contact.

Mild, general applications of this high-tension single-wire current have a marked constitutional effect, as became evident from the similar conditions experienced by all engaged in these experiments, and repeatedly

¹ As one coil of 13,000 winds has produced intense single-wire currents, I cannot be positive upon this point; and these coils demand such careful winding and insulation that they are not always fitted for high-tension experiments; this was with a resistance up to 2500 ohms; with lower resistance a higher electro-motor force could be utilized, *i. e.*, if heavier wire be used, and the result would be much more intense, as we find it from the Ruhmkorff coil.

experienced. A weariness, a relaxation, with nervousness in some, was followed by a healthy tire and refreshing sleep. The ordinary metallic electrode touched lightly to the motor points, with slow vibration, 80 to 100 per minute, contracts the muscle forcibly, and without pain; 500 to 1000 vibrations per minute are more painful. The rapid vibrator, 3000 per minute, gives a softer current, the sensation in all cases disappearing with a firm pressing down of the electrode.

I have cited these high-tension single-current effects from high voltage coils of the faradic apparatus on account of the physical facts which they demonstrate, and for the purpose of indicating therapeutic possibilities.

The peculiarities of opening and closing current, of positive and negative pole, of varying rates of interruption, and of difference in coils, are all marked in the high-tension current; the flash on single contact is observed only in the opening, not in the closing current, as the predominance of opening over closing current, which increases with increase of resistance, is very great with this high resistance; the predominance of the negative over the positive pole is likewise strikingly evident; the light, like the physiological effect, increases with the rate of interruption to a certain point, and then decreases; so likewise does the effect increase with an increase of the electro-motor force, or the number of winds in the coil, attaining a maximum with a certain relation of electro-motor force to resistance, then again to decrease as electro-motor and resistance increase still more.

In the glow of the lamp we see the fact well demonstrated that a certain phase of current, a certain coil, within given limits of the electro-motor force and resistance, is necessary to determine a certain effect. Precisely so is it with the coils needed for motor and nerve effects. We also see that a certain rate of vibration best produces the light effect, as definite rapidities of vibration are most effective for different physiological effects.

Therapeutic possibilities only can be indicated, as there is hardly sufficient intensity in the single-wire currents as obtained from the ordinary medical battery, even with 9000-wind coils, to produce very marked effects, and these are dependent to a considerable extent on the weather. To produce always reliable and efficient currents of this kind, we must have a stronger primary galvanic flow, and coils of higher electro-motor force, with less resistance, than is possible from the small spools of the medical instrument.

I was highly elated at the result of our first experiments, which happened to have been made under extremely favorable conditions, but soon found that these could not be relied upon, so that I would now be less sanguine in the hopes of therapeutic success; and yet this current merits consideration and trial. It is certainly of interest in its physical features.

A CONTRIBUTION TO THE STUDY OF THE TREATMENT OF
APPENDICITIS, WITH A TABULATION OF FOUR
HUNDRED AND FORTY-EIGHT CASES,
INCLUDING SEVEN CASES
OF THE WRITER'S.

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UNDER what circumstances is surgical interference justifiable and proper? It goes without saying that recourse should be had to the knife in cases manifesting signs of perforation, gangrene, or suppuration, in cases of frequent recurrence, and in cases where pain and tenderness continue, accompanied or not by a tumor. But shall we operate in "all cases of catarrhal and ulcerative appendicitis . . . as soon as the lesion is recognized?"¹ Or shall we follow the advice of Wier,² and delay operation in the milder cases of short duration "until it is indubitably proven that the invalidism is a confirmed one." Norman Bridge says: "Surgery is justifiable in all cases of undoubted chronic appendicitis, with occasional exacerbations, even if no induration is present."³

In studying the reports of cases for the purpose of arriving at an answer to these questions, we must conclude what symptoms, signs, and history are necessary for the diagnosis of appendicitis. Joseph Price says: "Cases of appendicitis that get well without evidence of severe lesion are always open to the doubt of being appendicitis at all."⁴ I cannot subscribe to this view. There seems, reasoning from analogy and from the general principles of pathology, no sufficient proof to establish this doctrine. It is also not in accord with the opinion accepted by the majority of the best surgeons of to-day. Fitz, as quoted by Dennis in his masterly article in the *Medical News*, vol. lxi. p. 698, places recurrence at 11 per cent. If Price's view were adopted, then but few, perhaps, would be found objecting to Senn's advice above given. But if the well-known signs and symptoms, as usually given without a history of recurrence, are considered a sufficient basis for the diagnosis of appendicitis, then there seems reason for hesitating before acting upon it. In this connection it is pertinent to note those cases of localized ulceration of the cæcum which may be mistaken for appendicitis. Aside from the cases noted in Dennis's article, already referred to, Dr. Sutton, of Allegheny, reports a case to me by letter, in which there

¹ N. Senn: *Journal of the American Medical Association*, November 2, 1889.

² *Annals of Surgery*, May, 1891.

³ *Medical News*, vol. lvi. p. 553.

⁴ *Annals of Surgery*, May, 1891.

was perforation of both cæcum and ileum, requiring resection. Dr. Bridge, in his article above cited, also describes a case which proves that all the symptoms of appendicitis, including recurrence and tumor, may be present without either abscess or appendicitis.

Of the seventy-seven cases¹ in the appended table in which it is known that operation was not deemed advisable, there were no deaths, and while they have not all been followed for any definite length of time, yet no recurrences are known to have taken place. By reference to the table it will be seen that many of this number are known to have remained free from trouble from one to six months and longer.

Dr. Fitz, as quoted by Joseph Price,² places recurrence at 44 per cent. in his paper written in 1890; while Kroft, quoted also by Price, puts it at 22 per cent.

Taking all the facts as given on the subject of recurrence, we must conclude that the large majority of cases are solitary, though we are not warranted in making a positive statement as to the exact percentage.

It is not known how many of these recurring cases of appendicitis terminate in resolution; but as Dennis says: "Nearly all authorities, however, are in accord with the general statement that a majority of the cases undergo resolution, and that only exceptionally perforation occurs."³

Senn,⁴ Morris,⁵ and Joseph Price⁶ regard the mortality of removal of the appendix as practically *nil* in uncomplicated cases. Morris, in a letter to the writer under date of April 22, 1893, says he has had "thirty-one cases of appendicitis in various stages of the disease, but without abscess, and all of these have made excellent recoveries after operation (two recent ones still in bed)." But how are we to tell before operation in all cases whether they are complicated or not? Is it not highly probable that there will often be found adhesions, which, while they enhance the danger of operation, render the likelihood of perforation or fatal peritonitis exceedingly improbable?

Of the fourteen cases of removal of the appendix during quiescence in the accompanying table, one died from sepsis. Occurring, as this death did, in the hands of a surgeon as well trained as Fenger, it must be given due regard. It seems warrantable to conclude, then, that *the danger of recurrence itself is not sufficient ground for operation.*

Well-defined tumors may disappear by absorption, the patient making a complete recovery.

¹ Fenger, 50; Hibbard, 3; Porter, 4; Griffith, 3; Saundby, 14; Link, 3.

² Annals of Surgery, May, 1891.

³ Medical News, vol. lvi. p. 699.

⁴ Journal of the American Medical Association, November 2, 1889.

⁵ New England Medical Monthly, April, 1893.

⁶ Annals of Surgery, May, 1891.

No tumor may be found, and yet large quantities of pus be present.

Presence of gas in an abscess may give a tympanitic resonance over a large collection of pus.

There may be no marked fulness, tenderness, or pain in cæcal region, and the operation prove the appendix perforated and the presence of pus and general peritonitis.

All the foregoing statements are proven by cases in the accompanying table. Hence, it may be said that the presence of a tumor is not of itself a sufficient warrant for operation, while it may be absent in cases clearly demanding one; that the absence of marked cæcal fulness, tenderness, and pain should not be deemed sufficient to bar operation; that tympanitic resonance, if other signs and symptoms demand it, should neither delay operation nor cause one to refuse to operate. The facts on which these conclusions are based, together with the case of Dana, in which the first symptoms were those of general peritonitis, and that of Winslow, in which there was absence of abdominal tenderness, with subnormal temperature, both cases dying on the third day,¹ serve to illustrate the difficulties of diagnosis which may arise, and emphasize the advice of Joseph Price to "resolve doubt by exploration." Browning's case of recovery after removal of a perforated appendix in the presence of general peritonitis and collapse teaches one not to refuse operation in any case, however desperate, if there is the slightest hope of success.

If we operate, on what day or hour of the disease shall it be done? In the accompanying table are fourteen primary cases that were suppurative or perforative almost from the beginning. A reference to Burnie's, Jacobson's, and Ransohoff's cases of removal during attack, in which there was general suppurative peritonitis on the first and second days of the attack, and to Jacobson's case of incision and drainage in which the pus was shut off from the general cavity of the peritoneum on the one hundred and thirty-seventh day of illness, still further illustrates the fact that a timely operation in one case, so far as hours and days are concerned, may be too late an operation in another.

A study of the appended table seems to show that there is less danger in deferring operation in recurrent than in primary cases. That this would be the case, we are led to believe by *à priori* reasoning because of the adhesions likely to form at each attack. Two facts seem settled: 1. When an operation is to be done, the earlier it is done the better the chances for recovery. 2. The character of the attack and consequent condition of the patient, and not the number of hours or days of illness, should form the basis of decision as to the proper time for operation.

Having decided that operation is advisable, what shall be the nature

¹ Both occur in annexed table under cases not operated.

of it? Here, again, the character of the case and the condition of the patient should form the basis of decision. Where an abscess has formed which may be opened and drained without invading the peritoneal cavity, there is grave reason for doubting the propriety of attempting the removal of the appendix except in those cases where the conditions will permit of its removal without undue prolongation of the operation or danger of tearing the adhesions which shut the pus out of the general peritoneal cavity. I cannot agree with Morton,¹ who says: "In no case should a simple evacuation of pus be considered sufficient, especially if the history of the case presented any account of former appendix trouble." Ransohoff, in a letter to the writer, says: "I have never lost a case of abscess. I do not look for the appendix. If it is in the abscess I remove it. If adhesions are present I let the appendix alone." He has had nine cases of appendicular abscess. This has been my experience in three cases, embraced in the accompanying table, one of them being an extremely unpromising one. This case would have died, I believe, had removal of the appendix been attempted.

The mortality rate of incision and drainage, in the cases here tabulated, is 18.18 per cent., and that of removal of the appendix during attack is 19.7 per cent. This is a decidedly favorable showing for incision and drainage, when we consider the number of cases treated by the latter method, because their desperate condition precludes the idea of any but the simplest operation; together with the fact that all cases treated by incision and drainage are pus cases, which are notoriously unfavorable for excision; and that many of the cases of excision are not pus cases, consequently are favorable cases for excision. The danger of permanent fistulæ or recurrence is urged by some against incision and drainage, but the danger from these sources cannot be compared to that incurred through efforts at removal. Against the more radical(?) operation, and in favor of the simpler one is: the time consumed in the operation; the danger of tearing through adhesions and opening an avenue for infection of the general peritoneum; and, finally, the fact that the removal of the appendix does not positively insure against fistulæ or relapse of inflammation. Referring to the table, it is to be noted that after excision there were in the 151 cases four in which were sinuses remaining unhealed after periods varying from two months to three years, and in one case two relapses, death following the operation for the second relapse.

In the 187 cases of incision and drainage there were seven fistulæ remaining after four months and longer. In those cases with general peritonitis, whether perforative or not, in which the appendix cannot readily be found, or, being found, is so adherent as to make its removal

¹ Journal of the American Medical Association, vol. x. p. 734.

a difficult or prolonged operation, the patient will, because of his depressed condition, be given a better chance for his life by incision cleansing, and drainage with tube or gauze, or both, than by excision—the latter operation being made later if necessary.

Dr. Edward Sonnenburg, an abstract¹ of whose article in the *Sammlung klin. Vorträge*, 1891, No. 13, is to be found in the *Annals of Surgery*, vol. xvi. p. 440, advises operation by two sittings in cases of appendicitis with deeply seated pus. He says: "Experience has shown that by this method it is possible within a few days to again find the deeply seated pus-focus, and then to open it without injuring the peritoneum. Since in this way the operative procedure brings the patient no danger, it will be more readily possible in even doubtful cases to decide for operative treatment, and thus make the treatment more rational." Just how many cases he has operated in this way is not stated, nor is the precise method of operating given in the abstract—the original I have not seen. The greatest objection to this method of operating is, perhaps, that while we are waiting for adhesions to form after the first sitting before completing the operation, the abscess may burst or the patient become septic. Yet if, as Sonnenburg says, this "procedure brings the patient no danger," might it not be commenced so much earlier than the usual operation as to rob this objection of its force? The probability of its being a safe method of treating a class of cases which, with methods now in general use, has given us a frightful mortality, is strong enough to warrant a trial of it.

What shall be the method of operating for removal of the appendix? Where there is a tumor this is often taken as the guide for the incision. In the absence of tumor the majority seem to favor incision in the right semilunaris and the wisdom of this choice is proven not only by the operations thus made, but also by the results of Bryant's² investigations of the anatomy of the appendix. In his table concerning the location and direction of the appendix, we find it inward in 34, behind the cæcum in 32, downward and inward in 28, and into the true pelvis in 21, in a total of 144 cases. Either of these locations is accessible through this incision. Trendelenburg's posture, allowing, as it does, the pus to run out if present, and the operator to see the parts he is operating upon, renders comparatively easy and safe what in any other position would be a difficult and dangerous operation.

The complete and permanent recovery of the patient after removal of the appendix depends in no small measure upon the treatment of the stump. The ideal method seems to be that in which the stump, after ligation, is turned into the cæcum and buried by Lembert sutures, as described by Senn in his article referred to above, and described and

¹ William Browning (Brooklyn).

² *Annals of Surgery*, February, 1893.

illustrated by Morris in the *New England Medical Monthly*, April, 1893, p. 331. Indeed, I am convinced, by a careful study of all the literature upon this point accessible to me, that unless the stump be thus treated or in some way be covered by peritoneum after ligation, the removal of the appendix leaves the patient in great danger of perforation. One of the cases (Browning's) in the accompanying table might be chosen from among a number as a reference to emphasize this statement.

Care should be used in closing the wound in the abdominal wall to secure against ventral hernia. Whether or not the danger of hernia is less after stitching the several layers of tissue separately, than it is after stitches carefully applied in the ordinary way, I have been unable to satisfy myself from the material at my command.

Whole number of cases	448
" " " recoveries	371
" " " deaths	77
Average mortality rate	17.23 per ct.
Removal of appendix during attack	{ Recovered . 122 = 80.3 per ct. Died . 29 = 19.7 "
	151
Removal of appendix during quiescence	{ Recovered . 13 = 92.86 " Died . 1 = 7.14 "
	14
Incision and drainage	{ Recovered . 154 = 81.82 " Died . 34 = 18.18 "
	188
Appendicitis—no operation	{ Recovered . 82 = 86.32 " Died . 13 = 13.68 "
	95

ON THE OCCURRENCE OF A FORM OF CHRONIC BRIGHT'S DISEASE, OTHER THAN TYPICAL FIBROID KIDNEY, WITHOUT ALBUMINURIA.¹

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SINCE Bright first directed attention to the relationship existing between albuminuria and diseases of the kidney, the presence in the urine of serum-albumin in quantity detectable by time-honored tests has properly been accepted to indicate renal derangement. So necessary is this association generally regarded that many otherwise acute clinicians, in pinning faith to the presence of albumin as an infallible guide to the recognition of nephritis, are not infrequently led into the error of inter-

¹ Read before the Pan-American Medical Congress, Washington, September, 1893.

preting this fact into the necessity of excluding kidney disease with the absence of albumin; for not infrequently do we encounter in published reports of cases, otherwise admirably presented, in which a diagnosis may hinge upon the renal condition, the conclusion stated as if none other were possible, that the kidneys are sound, the urine being free from albumin. Search may also have been made for casts, which, unencountered, naturally strengthens the opinion previously reached.¹ In such cases no cognizance is taken of often a more important examination, the determination of the nitrogenous output; or of the highly momentous fact, apparently little known, that albumin may be totally absent from the urine throughout the course of chronic Bright's disease, and casts may be only detectable after much search, yet the case progresses steadily to a fatal termination, the remote ailment perhaps never being suspected, either *ante-* or *post-mortem*; the determining cause of death, a pneumonia or an inflammation of a serous membrane, alone being recognized. It is, indeed, not improbable that chronic nephritis without associated albuminuria is of no uncommon occurrence. That it exists undetected and untreated there is no doubt. It thus must increase to some degree the mortality record of other ailments; death, in these cases, often ensuing less from total renal failure than from visceral or serous complications induced by long-continued partial renal inadequacy.

My attention was first directed especially to this subject by encountering the first two of the cases herein recorded. One of these, with certain symptoms suggestive of decided renal inadequacy, but without those that are usually regarded as typical of chronic Bright's disease, had consulted several clinicians of note in this city, and Charcot in Paris, as to his ailment, which he suspected to be renal because of the small amount of urinary solids habitually excreted; but because of non-detection of albumin and casts, the case had been dismissed by these as one of hypochondriasis or of neurasthenia. As laboratory work brought me not infrequently into contact with this case, several cursory surveys of the symptoms, subjective and objective, caused me to suspect a latent kidney ailment, despite the negative opinions previously given. I then instituted a careful examination of the urine for some time. A brother of this patient, with somewhat similar symptoms, who also came under observation, was believed on examination to be affected similarly. Encountering these cases suggested a search for others. A number of these were so soon collected as to indicate that the combination of chronic

¹ In instances such as this it is not improbable that a microscopic examination is often not thorough, the absence of albumin prejudging the observer against more than a perfunctory search; for in any condition with non-albuminous urine, or urine containing but minute traces of albumin detectable only by most delicate tests, renal epithelia or casts cannot be numerous. Their discovery often then necessitates painstaking search, even under such favorable conditions as the use of the centrifugal machine to obtain concentration of sediment, and intelligent employment of a low-power lens as a searcher.

Bright's disease without albuminuria was of no unusual occurrence, and that I had probably overlooked many instances in the past. It likewise clearly showed that similar cases were undoubtedly commonly unrecognized.

Not that the occurrence of this supposed unusual condition is absolutely unknown, or, in connection with symptoms of typical granular or cirrhotic kidney, has passed altogether undetected; for more than four decades ago Wilks,¹ of Guy's Hospital—the birthplace of our knowledge of albuminuria and of Bright's disease—in first describing the two principal forms of chronic nephritis,² to which description all later English writers have more or less adhered, also pointed out that the granular kidney³ could occur and run its course quite symptomless, albuminuria sometimes being absent. Since that time, however, though the occasional occurrence of typical fibroid kidney without albuminuria has not been forgotten, the likelihood of its existence has only been recognized by a few. No text-books on general medicine especially notice the occurrence, and few special treatises on renal disease more than barely mention what Wilks observed. Some of our leading authorities fail even to lay stress upon the occasional absence of albumin in typical granular kidney. These not only overlook the class of cases I now report, but neglect to note that, even with classical symptoms of fibroid kidney, such as pale, plentiful urine, fibroid vessels, and hypertrophied heart, occurring at middle life or in the aged, chronic Bright's disease may occur and run its course without albuminuria.

Bartels,⁴ it is true, cites a case carefully studied in the five weeks preceding death, in which albumin was totally absent from the urine except during a few days in which high fever occurred, due to vaccination. Though with symptoms suggestive of renal fibrosis, because of the absence of albumin, an ante-mortem diagnosis was not made. In narrating this case Bartels indicates his idea of the infrequency with which similar cases occur, though he states that he has repeatedly witnessed the *temporary* absence of albumin in chronic Bright's disease.

Jaksch, whose work on laboratory and clinical medical diagnosis is our accepted authority, totally fails to recognize these cases. He speaks of periods of temporary absence of albumin in granular kidney, but

¹ See Guy's Hospital Reports, vol. viii., 2d series.

² The term nephritis is not used here in a strict pathological sense, but refers equally to true inflammation of the renal structure as to a condition which is actually *non-inflammatory*, but of the nature of a degeneration. Sir William Gull pointed out, in describing the arterio-capillary fibroid kidney (AMER. JOURN. MED. SCIENCES, 1886, vol. xci. p. 407), what previously, I believe, had been recognized by others, that the renal changes are not really of an inflammatory nature, so that the term *nephritis* is strictly not justified here. There is no acute stage; no acute hyperæmia; no diapedesis of leucocytes and blood-cells, characteristic of ordinary inflammation; and no local or general symptoms indicating nephritis.

³ Looked upon by Wilks as an indication of senility, with its associated tortuous thickened radials, characteristic pale abundant urine, and tendency toward uræmia or apoplexy.

⁴ v. Ziemssen's Cyclopædia, vol. xv. p. 440.

states that an examination of the total twenty-four hours' urine will nearly always reveal its presence, which has not been discovered in a single specimen passed perhaps in the forenoon. Even the late Fagge, under whose eye in Guy's Hospital cases of typical arterio-capillary fibroid kidney, reported by Mahomed, were studied, in which albuminuria was absent or was but an inconspicuous feature, lays little emphasis upon such a combination in his splendid classic on Medicine. Our own writers on general medicine remark still less the occasional absence of albumin in these cases. The most recent and most widely read text-book is that of Osler, a name occupying a pre-eminent position in medical science. This work, because of its inherent worth, embodying the results of years of faithful observation and patient research, and because of the deserved wide fame of the author, is easily first of its kind. Yet Osler, too, here fails to assist in the recognition of the class of cases in question. He speaks only in this relation of that variety of granular kidney, such as was described by Wilks, in which polyuria is common. In this he merely states that traces of albumin are found, but may be absent at times, particularly in the early morning urine.

But two writers on diseases of the kidney, and these Americans, Millard and Purdy,¹ have especially directed attention to the occurrence of chronic nephritis without albuminuria, referring, however, only to the usually described variety of granular kidney with typical symptoms. Millard relates two cases in which albumin, though frequently examined for, was at no time found. One of these was shown *post-mortem* to be interstitial nephritis with a limited glomerulo-nephritis. The second was a probable case of renal fibrosis. Death did not occur while this case was under observation. The general health was good. Casts were repeatedly found in the urine, though albumin remained absent.

Both Millard and Purdy refer to the important papers by Mahomed,²

¹ The former in his work on Bright's Disease; the latter in a special paper, "The Pre-Albuminuric Stage of Chronic Bright's Disease," Chicago Med. Journ. and Exam., May, 1885. Purdy refers only to the typical arterio-capillary fibroid kidney of Sir William Gull. Curiously, in his work on Bright's Disease, published a year subsequent to the appearance of this paper, Purdy barely states, in discussing cirrhosis of the kidney, that "albumin may be temporarily absent in the early stage, but as a rule it will be found, if it is sought for, over a sufficient length of time."

² "The Clinical Aspect of Chronic Bright's Disease," Guy's Hospital Reports, 1879, vol. xxiv. "Chronic Bright's Disease Without Albuminuria," Guy's Hospital Reports, 1880-81, vol. xxv.

It is necessary here to state that in reviewing Mahomed's statistics, Dr. Purdy places the figure of non-albuminuric cases among these as too high. He also assembles with these, I think improperly, 76 cases out of a total of 98 in which a diagnosis of Bright's disease was not made, observed at the Birmingham General Hospital, reported from post-mortem records by Dr. Saundby, in a paper "On the Occurrence of Dropsy in Granular Kidney." Though it is not stated by Saundby that albumin was searched for in the urine of the 76, Dr. Purdy thinks that it may be fairly assumed that such examinations were made, since the cases were under observations in hospital, and perhaps subject to the usual rule for daily examination of urine. But as many of these were cases of hernia, bronchitis, fractures, amputations, burns, ulcers, skin diseases and the like, in which a urine examination could not have seemed especially indicated, and as no account of such examination appears in Saundby's report, it is unfair to assume

in which are analyzed a number of cases of granular kidney, under observation in Guy's Hospital during 1879 and 1880, in which albumin was more or less constantly absent from the urine in the period in which observations were made. Most of these cases were in the degenerative period of life, with fibroid arteries and hypertrophied heart, but were without special symptoms referable to the kidney.

Though a strikingly interesting series of cases, and ably reported by Mahomed, his description of at least a minority of them¹ does not make it clear that renal disease was a certain accompaniment of the symptoms described—referable in the main to other organs. In this minority, no account of microscopic examination of urine is given, and in a number of cases the urine is described as normal. Estimations of nitrogenous excretion in any save a few, and in these to but an imperfect extent, were also not attempted. In a few of those in which death occurred while under observation and a necropsy was obtained, the kidneys were also stated to be healthy, though the cases were regarded by Dr. Mahomed as those of chronic Bright's disease, as he understood the term.²

Mahomed adopted the term chronic Bright's disease as a convenient generic name for a condition which Gull and Sutton had previously described of generalized arterio-capillary fibroid change. Contrary to the view of Johnson, an extension of that of Bright, and following in the lead of the above-mentioned investigators, Mahomed viewed the condition underlying the various stages of granular or fibroid kidney as

that albumin was habitually or even occasionally absent. [Since writing the above note, Dr. Saundby has kindly informed me by letter that Dr. Purdy is wrong in his assumption; that so far as he (Dr. S.) knows, no examinations for albumin were made; the cases came from anybody, and that he knew nothing of their clinical history. Dr. Saundby also tells me that he does not think albuminuria often absent in Bright's disease.] In the first report of Mahomed's, on 100 cases of granular kidney observed in Guy's Hospital, in which death occurred in 26 directly from kidney disease, it is stated by Mahomed that albumin was absent from the urine, not in all, but in a large proportion (exact number not stated), so that Dr. Purdy's figure of 74 per cent. of non-albuminous urine in 259 cases of granular kidney (Mahomed's and Saundby's) is not a little excessive. Apart from this, as I have elsewhere stated in this paper, it is not certain that a number of Mahomed's cases, though perhaps rightly styled by him cases of chronic Bright's disease, as he understood this term, were in reality suffering from actual renal disease.

¹ Such as cases 16, 17, 18, 19, 22, 23, 24, 25, 27, 30, 37, 42, 43, 47, 48, 52, 53, and 56.

² As a result of certain considerations, which Dr. Mahomed thought supported his view, he recognized three stages of chronic Bright's disease. Of these the first, a functional stage, he regarded as limited to a condition of simple persistently high arterial tension, without organic changes in the vascular system or in the kidneys. This stage, he believed might precede for years the onset of degeneration in the kidney. The second stage, he termed chronic Bright's disease without nephritis—using the term nephritis in the strict pathological sense of a true inflammatory condition of the kidney. In this stage the organic changes are apparent in the vascular system and in the kidney (arterio-capillary fibrosis—red granular kidney). The kidney, post-mortem, is found to be the seat of interstitial change, without epithelial alteration. In the third stage, which Mahomed classed as chronic Bright's disease with nephritis (the mixed or mottled granular kidney), he regarded as the natural but by no means invariable termination of the ailment. In this stage, epithelial changes have occurred in the kidney, the cirrhotic alterations are marked, and the symptoms of renal disease prominent. This, he stated, is the stage in which the disease is usually diagnosticated. The 61 cases which he reported characterized by the absence of albumin from the urine, he considered as belonging to the second of these stages.

a systemic disorder in which the cardio-vascular alterations were not dependent upon, but either antedated the development of the kidney fibrosis, or, more rarely, existed without renal change.¹ It was not necessary for him that the kidney should actually be the seat of degeneration to constitute Bright's disease. Fibroid kidney was but an unnecessary, if more or less to be expected, incident in the general morbid state. Renal fibrosis did not always appear, though general arterial change occurred. Yet Mahomed thought kidney alterations present in most of the cases he reported at this time, although in a number of them, as has been stated, there seemed no positive evidence of this, and in two it is recorded that a necropsy showed healthy kidneys.

Mahomed's views were extreme in that he regarded a thickened vessel as a certain forerunner of fibroid kidney, if the latter were not already existent. Without desiring to discuss here the still unsettled question as to the sequence of events in chronic Bright's disease, whether cardio-vascular alteration precedes or accompanies the renal, claiming a common origin, or follows the latter, dependent upon kidneys already inadequate through disease, I may say that I am by no means prepared to admit that a diseased kidney is the sole cause of increased vascular tension and subsequent arterial degeneration; nor can I accept Mahomed's teaching that persistent high arterial tension or a thickened vessel is a certain indication of present or expected kidney change.²

Apart, however, from the doubtful cases of renal disease among those reported by Mahomed in which albuminuria was absent, there remain a good number in which, with the urine free from albumin, undoubted granular kidney existed. Be that as it may, Mahomed's cases were all in middle or advanced life. There were present decided cardio-vascular changes, such as hypertrophied heart and thickened vessels. These cases were reported especially to show that in the stage of Bright's disease in which epithelial alterations in the tubules were absent—or, if occurring, were but transitory in character—albuminuria was absent, the urine remaining practically normal, and symptoms referable to the kidney, *i. e.*, those of renal inadequacy, were uncommon. Death in these cases, as Mahomed remarks is usual in granular kidney, resulted from failure of other organs, notably the heart.

The few cases I here report in which the character of symptoms, together with result of frequent urine examinations, leave no doubt as to the existing diseased kidneys, although albumin is absent from the urine, are of a class distinct from the cases hitherto described in which a diag-

¹ See preceding foot-note.

² Mahomed styled a high-tension radial a *renal* pulse. He suggested that visible and tortuous temporals were an indication of renal disease, and regarded this as a point to aid in the separation of a mitral insufficiency, the result of a previous rheumatic endocarditis, from that arising from overstretching of the left ventricle as a result of resistance *a fronte* in the arterial sclerosis of fibroid kidney.

nosis of fibroid kidney could be made from the association of age with cardio-arterial disease and with such a common symptom as abundant, low-gravity urine. In the latter, apart from general fibroid changes, the kidney was in most cases fairly healthy and functionated accordingly. In my cases, without cardio-vascular symptoms other than increased tension, there are present those referable to the kidney, with, in several, marked renal inadequacy both as regards excretion of water and of solids.

In the urine examinations of all the cases here recorded, the following methods were employed: Albumin was in every case examined for in mixed specimens of the twenty-four hours' urine, as well as in single specimens voided at varying times in the day. The tests used were a saturated solution of plain picric acid—this was in every instance the test first applied to each specimen of urine examined;¹ Millard's phenic-acetic acid solution²—this was used when no response occurred to picric acid, and on other occasions to confirm results obtained by picric acid; metaphosphoric acid was also often employed, not alone, but in addition to the other tests. Indications of even a slight contact ring occurring to picric acid or Millard's solution, either immediately or after standing for some time, a second specimen of urine was treated with glacial acetic acid. If the urine was concentrated—rich in salts—an excess of acid was added to insure complete precipitation of any mucin present.³ 'This;

¹ Recent experiments in these and in other cases have convinced me that even plain (unacidulated) picric acid solution *will* precipitate mucin. This I had before doubted, on the authority of Johnson, and was inclined to accept as an indication of serum-albumin any slight though sharply defined ring obtained by the contact method with cold picric acid solution and *clear* urine, not subsequently dissipated by heat. Recent experiments have shown me that mucin is occasionally present in non-(serum)albuminous urines in amount sufficient to respond to the picric acid test even so applied, and also to Millard's test, and to metaphosphoric acid. This is not, however, usual, as I have repeatedly failed to obtain any response to clear urine by the overlying method with plain or citrated picric acid, examining the tube even after several hours' contact. It is usual to obtain a mucin reaction to the boiling test with acetic and picric acid, which is improperly sometimes employed as a *delicate* test for serum-albumin. The slight cloud obtained with acetic acid and boiling, in urines not rich in salts, is undoubtedly often due to mucin, as can readily be proved. Fortunately little harm can usually result, in cases of suspected kidney disease, from the error of mistaking mucin for serum-albumin, since the presence in the urine of the former, with evidences of renal derangement, is often only the precursor of the latter, and probably arises from faulty metamorphosis of the cells of the renal tubules—of course, excluding vesical, urethral, and vaginal catarrh as a factor in its production.

With several years' steady use of the picric acid test, I still regard it as the most delicate reagent for the detection of traces of albumin, and, intelligently used, as the best of the many tests in use. Millard's phenic-acetic acid test I rank second, and frequently use. It must be recalled that this also, like picric acid, will respond to so-called peptones, to mucin, and to urates. Response, therefore, occurring with these, unless very decided and leaving no doubt as to its nature, requires confirmation by the method above suggested. Tanret's solution, and other tests with mercuric chloride and those with tannin, such as Sebelein's reagent, are unreliable for the detection of albumin because of other sources of error even than those just mentioned. The same may be said of the trichloroacetic acid test.

² Glacial carbolic acid (C. P.), 95 per cent., 3ij; glacial acetic acid (C. P.), 5vij; mix and add solution of potash, 3ij, 5vj. Filter. The sp. gr. of this solution is 1027.

³ Concentrated urines, rich in salts, will not yield mucin, if present, to a small amount of acetic acid. An excess of that necessary to form acetates with the salts present must be added before precipitation can occur. This is a practical point of great importance little attended to.

after agitation, was subsequently filtered and the filtrate exactly neutralized with strong (25 per cent.) NaHO solution.¹ The filtrate was then slightly acidulated with acetic acid, and the various tests above mentioned once more applied. Any indications of response now occurring, separate portions of the urine were further carefully tested with heat, with HNO₃, and often also with acetic acid and potassium ferrocyanide.

In all the microscopic examinations the centrifugal machine was employed to obtain a sediment, and usually from the precipitate taken from the urine which had been standing for some hours.²

Urea was estimated by the hypobromite process (bromine itself always being employed), with a modification of the Russell and West apparatus, which, as comparison with a tried and more complicated apparatus had shown, was very accurate clinically.

Uric acid was estimated by the method of Haycraft. Acidity, when taken, was estimated by titration with $\frac{N}{10}$ KHO or NaHO. The chlorides were estimated as total chlorine by Volhard's method.³ The figures indicating total urinary solids⁴ in the tables are simply calculated in grains by multiplying the last two figures of the specific gravity by the number of ounces of urine passed in the twenty-four hours.⁵ This method, of course, furnished only a very rough approximation, but used with coincident urea, or urea and chlorine estimations, it is all that is necessary. It alone may be made to furnish results of some clinical

¹ NaHO was used in preference to KHO, as an excess of the potash salt present in the urine would, in subsequently testing with picric acid, form a precipitate of potassium picrate, thus interfering with the reaction for albumin. A strong solution of alkali was used, so that if but traces of albumin were present the latter be not so diluted by addition of these reagents as to cease to respond to tests used for its recognition.

² Both the two-bottle milk-testing machine made by Messrs. J. E. Lonergan & Co., of this city, and the equally efficient, and for clinical work more practicable, smaller apparatus of Messrs. Queen & Co., were used. The utility of the centrifugal machine as an aid in the production of urinary sediment for microscopic work is great indeed. In my experience the deposit resulting is both richer in quality and quantity than that obtained by gravity. Clear urines showing little or no sediment after some hours' standing can be readily made to yield a precipitate by its use, and casts but scantily present in the sediment resulting from standing without its employment, which might not be found, can often readily be secured by the aid of this adjunct to the production and concentration of a precipitate.

³ Estimations of chlorides were made as probably the most important mineral constituent of the urine, and that which has been found diminished in cases of chronic nephritis.

⁴ Normally, the total urinary solids excreted average about 65 gram., or 1000 grains. The daily amount of urine averaging 1500 c.c. (50 fl. oz.), and the sp. gr. = 1020, then $50 \times 20 = 1000$ grains or 66 gram. The average daily output of urea is between 30 and 40 gram. (450 to 600 grains), or about one-half the total solids, the amount varying considerably with sex, body weight (about 1 gramme should be excreted for each five pounds of body weight), and amount and character of food eaten.

Daily excretion of chlorides, calculated as NaCl, equals 10 to 15 gram. (154 to 246 grains), or somewhat less than one-half the urea. Calculated as chlorine, chlorides equal 6 to 9½ gram. The daily amount of uric acid excreted is very variously placed, the average probably being 0.5 gram (7 to 10 grains).

⁵ This method is much more convenient and gives approximate results of greater accuracy than those obtained by the use of Christoson's (Haesen's) or Trapp's formula. It furnishes a figure midway between that of the two. By the former the last two figures of the sp. gr. are multiplied by 2.33; the resultant is multiplied by the total number of c.c.'s of urine passed. This product divided by 1000 = the total amount of solids in grains. Trapp's factor is 2.

accuracy, provided the amount of NaCl excreted is also ascertained.¹ It is, of course, most essential that an accurate urinometer be employed and corrections for temperature made.

CASE I.—W. B., analytical chemist, aged twenty-nine years; unmarried; weight, 147 pounds. No history of lead, syphilis, or alcohol. Habits studious and temperate. No diseases of childhood. As a boy, robust. Family history as to renal or cardiac disease negative. His father has been a generous liver, and has had several attacks of typical gout. For the past three years W. B. has suffered from severe headaches and incapacity for exertion, worse in the latter half of this period. Constant headaches and muscular weakness have been present, increased by slight physical exercise or mental strain. Two years ago, during a period in which he was feeling particularly bad, his urine, examined by himself with nitric acid, showed the presence of albumin. This was discovered in a single unmixed specimen of the morning urine, and once only, though often afterward frequently examined for. An estimation then of the total urinary nitrogen excreted showed a considerable diminution from the normal. Fancying himself the subject of kidney disease, he shortly after this consulted at odd times several practitioners in this city, and, in the summer of 1892, Charcot, in Paris. These were unable to find either albumin or casts in the urine and gave on this account a negative opinion as to renal disturbance, though the symptoms certainly were suggestive of grave inadequacy. There was no improvement on the lines of treatment suggested, but rather an aggravation of symptoms. After a course of spinal and loin douching under Charcot, loin pain developed which is now present, with headache, vertigo, and general malaise on any extra exertion, or when a non-nitrogenous dietary is departed from. There is but little anæmia. Digestion is fairly good. No indications of external œdema have ever been noticed. There are no eye changes. I have had the case under observation about a year and a half. When first examined physically, shortly before this, persistent high arterial tension was noted, with accentuation of the aortic second sound at the apex. The area of cardiac dulness was not increased, nor has it since become so. The apex-beat is still in the normal situation, about two inches below and a half-inch within the nipple. Persistent high tension, without as yet signs of notable thickening of the arterial coats, has always existed since, except in the past three months, during which he has been on a strictly vegetable diet, eating no meat, meat soups, eggs, or fish. The influence of this diet upon symptoms and pulse tension is quite remarkable. Under it, if no extra physical or mental exertion is undertaken, very little headache, vertigo, or loin pain is felt.

The accompanying sphygmogram is one of several, all practically similar, taken at various times after having been between two and three months on a non-nitrogenous diet. It is practically a normal tracing, showing a moderate degree of tension.

FIG. 1.

W. B., June 10, 1893. Pressure, $1\frac{1}{2}$ ounces; sitting.

Since the single occasion on which he detected albumin in his urine by nitric acid, two and a half years ago, very frequent observations, in both mixed twenty-four hours' specimens and that passed at various times in the day, have never resulted in showing the slightest trace to heat or to nitric acid. For a long time metaphosphoric acid was used in addition to heat and nitric acid, as a more delicate test for the recognition of small amounts.

¹ As my friend Dr. Leffmann suggests to me.

Though the tests with the last named were always resultless, a slight response was often obtained with metaphosphoric acid; but as mucin, also precipitated by this acid, was not eliminated as a source of error, minute traces of albumin may or may not then have been present, as they are occasionally now.

When urine is ordinarily pronounced albumin-free, it is meant, almost without exception, absent to tests commonly employed, such as heat and nitric acid, which, applied with care, detect albumin in small amount but not in minute traces (less than 1 to 100,000).¹ In the cases of granular kidney before referred to, such as those of Wilks and of Mahomed in which no albumin was found in the urine, heat and nitric acid were the tests probably employed for its detection.² In my cases the absolute absence of albumin was most usual, for during the period in which examinations were made, as a rule, reactions did not occur to tests (picric acid, the pheno-acetic acid solution) showing traces as minute as 1 to 200,000 to 300,000.

In the past year, besides examinations by the patient and by myself, with picric acid as the reagent, of a number of unmixed specimens, at short and more lengthy intervals—specimens passed at various times in the day, as regards food and exercise—I made careful daily tests of mixed twenty-four-hours' samples in the period named in the accompanying table, except when piperazin was taken. As a rule, not a trace of a response could be obtained with the untreated, clear urine overlaid with picric acid; occasionally a mucin response occurred, and, rarely, a ring which further treatment showed to be serum-albumin. No marked response was ever thus obtained to the picric acid or Millard's solution, and the results were always negative with heat and with nitric acid. In microscopic examinations, at various times, of specimens of the mixed urine, typical granular and hyaline casts, broad and narrow, were found on several occasions, but never in any amount, and only after some search. Cylindroids were also present. Besides a variety of epithelium, from the bladder and its accessories, and cells of undetermined origin, occasionally those typical of the convoluted tubules were seen in small number. Isolated pus-cells also were occasionally encountered. An abundance of calcium oxalate crystals were present in nearly all specimens, and often considerable free uric acid. Spermatozoa were occasionally seen. As a rule, the urine, of light amber color, yielded but little sediment, and in cool weather remained undecomposed longer than is common. But while piperazin was being taken, sediment was abundant and decomposition occurred early, as is usual. At this time but three microscopic examinations were made, and these were cursory. No casts were seen. There was an abundance of bacteria, calcium oxalate crystals, free uric acid, ammonium urate, and amorphous urates.

The following is an analysis of the most important constituents of the urine over a period of twenty-three days. Much more fluid was ingested than was

¹ I accept this limit of reaction, more extreme than is usually given, on the authority of Millard (Bright's Disease, 3d ed., p. 85).

² In a very courteous letter recently received from Dr. P. H. Pye-Smith, senior physician to Guy's Hospital, he informs me the tests employed by Dr. Mahomed were: 1. Heat, with the addition of acetic acid, to neutralize alkalinity, if present, and to neutralize any calcic phosphate-precipitated by heat. 2. Cold nitric acid, carefully overlaid by the urine. Dr. Pye-Smith also says that, though other tests, such as ferrocyanide of potassium and acetic acid, acidulated brine, and picric acid, were employed from time to time in the hospital, in 1879 to 1881, the date of Mahomed's observations referred to, the tests by heat and by nitric acid only were those in constant use in the wards. Had other than these two been used by Dr. Mahomed in his observations, Dr. Pye-Smith remarks, Mahomed would have mentioned the fact in the Guy's Reports.

required to satisfy thirst, during the greater part of this time, in order to stimulate the kidneys to greater activity. Schering's piperazin, in doses of five grains four times daily, was tried for the same purpose for a period of a week. Apparently the only effect of the piperazin was to render the urine more readily decomposable, without markedly lowering acidity. The average daily quantity of urine passed in the twenty-three days (1085 c.c.) is in excess of that usually voided; polyuria has at no time existed. Prior to onset of symptoms of renal inadequacy, the urine had been of normal amount. Subsequently it was commonly diminished in quantity, and has remained so. Nitrogenous excretion during the twenty-three days, though in excess of that passed when analyses were made by himself some months previously, is considerably below (100 to 150 grains daily) what should be excreted by a healthy male adult in active life. Though on ordinary diet during this time, urea elimination was only about one-half the normal average of 35 grammes (18.56 grammes). The daily average ratio of uric acid to urea (1 to 26) is much lower than what is regarded as normal. In this case urea excretion being diminished and elimination of uric acid probably not being interfered with, the ratio would, of course, be less than the physiological figure of 1 to 40 or 1 to 50. The average excretion of chlorides (as chlorine) is considerably below normal. This, however, does not necessarily indicate impaired renal excretion, though the latter is probably here present, as other causes, notably gastric hyperacidity or hypersecretion, which, apart from renal inadequacy, produce similar diminution, are absent.

Date.	Daily average amount of urine in c.c.	Daily average amount of urine in fluidounces.	Color.	Specific gravity of mixed 24-hour specimens.	Degree of acidity calculated on 100 c.c. urine.	Daily elimination of urea in grammes.	Daily elimination of urea in grains.	Daily elimination of uric acid in grammes.	Daily elimination of chlorine in grammes.	Approximate daily amount of fluid taken.	Remarks.
1893											
Jan. 31	1740	58	Light amber.	1013	7	22.70	352	0.764	Not estim.	Over 4 pints	Meat diet throughout the 23 days.
Feb. 1	1650	55	"	1014	11	18.00	277	0.329	"	"	
" 2	1400	46 $\frac{2}{3}$	"	1015	18	20.00	308	0.950	"	"	
" 3	1390	46 $\frac{1}{3}$	"	1012	20	19.50	300	0.780	5.60	"	
" 4	950	35	Darker amber.	1021	20	19.00	292	0.729	4.20	13 $\frac{1}{4}$ pints	
" 5	920	30 $\frac{3}{8}$	"	1020	13	18.40	283	0.934	4.00	"	
" 6	770	25 $\frac{2}{3}$	"	1020	24	17.75	273	0.569	2.70	"	
" 7	1160	38 $\frac{2}{3}$	Light amber.	1015	15	21.00	323	0.779	3.50	2 $\frac{1}{4}$ pints	
" 8	1550	51 $\frac{1}{3}$	"	1016	...	21.75	335	0.989	6.37	"	
" 9		31	"	1018	15	18.00	277	0.729	Not estim.	"	gr. xx piperazin taken.
" 11	931	31	"	1018	15	18.00	277	0.729	Not estim.	"	" " "
" 12	1130	37 $\frac{2}{3}$	"	1020	20	23.75	365	0.987	4.50	"	" " "
" 13	875	29	"	1021	20	17.50	269	0.666	3.50	"	" " "
" 14	700	23 $\frac{1}{3}$	"	.....	40	19.00	292	0.600	4.60	1 $\frac{1}{2}$ pints	" " "
" 15	850	28 $\frac{1}{3}$	"	1021	30	15.00	237	0.456	2.20	"	" " "
" 16	1025	34	"	1021	25	16.80	258	0.725	6.45	"	" " "
" 17	960	32	Darker amber.	1022	22	16.32	251	0.693	3.50	"	" " "
" 18	1400	46 $\frac{2}{3}$	"	1021	20	19.60	201	0.700	7.10	"	
" 19	1025	34	Light amber.	1021	20	20.00	308	0.725	5.50	"	
" 20		34	"		20	20.00	308	0.725	5.50	"	
" 21	955	31 $\frac{2}{3}$	Darker amber.	1024	25	20.00	308	0.765	6.35	"	
" 22	1000	33 $\frac{1}{3}$	Light amber.	1021	18	22.00	338	0.924	5.25	"	

Average daily amount of urine passed, 1085 c.c., or 36 fluidounces.

" " " " urea excreted, 18.56 grammes, or 285.82 grains.

" " " " uric acid excreted, 0.713 gramme, or 11 grains.

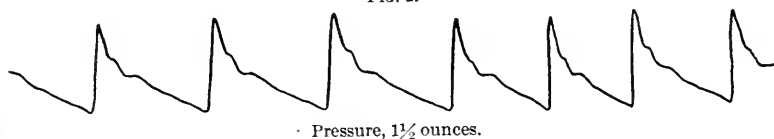
" " ratio of uric acid to urea, 1 to 26.

" " amount of chlorides calculated as chlorine (18 days), 4.82 grammes.

Approximate daily average amount of total urinary solids, 43 grammes, or 666 grains.

CASE II.—J. B., aged thirty-one years; brother of Case I.; unmarried; best weight, 140 pounds. No lues; no lead-poisoning. Had slight attack of scarlatina when aged eight years; no complications attended it. Between the ages of eighteen and twenty occasionally drank a trifle to excess of beer and wine; but excess for him would be moderation in another of more robust build. He was easily affected by alcohol. Has been very temperate since twenty years of age. Has always been looked upon as delicate; was in best condition when roughing it on the plains four years ago. Began to visibly fail in health two years ago, shortly subsequent to a two weeks' vacation, during which he had indulged in a little mild dissipation incident to hotel life at a fashionable seaside resort. Lassitude, attacks of severe headache about vertex and nucha were first noticed. Spells of headache have since been frequent. Though these occur independent of exertion, they are especially induced by it, especially by a long walk, as is the case with the brother. More or less steady pain across the loins has been noticed for over a year. Accompanying it is a feeling of tired, weak back. During the past six months vertigo has frequently accompanied headache. These are often present on rising in the morning. Recently an attack of vertigo occurred in which he states that, though he did not lose consciousness, he felt "queer," and nearly fell. He was dazed afterward and was not himself for over two days. Digestion has never been above the average. Within the past year

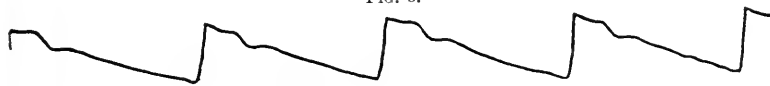
FIG. 2.



Pressure, $1\frac{1}{2}$ ounces.

it has been impaired. He is flatulent, and nausea after meals is frequent. A stomach examination recently made showed motility lowered, with diminution in free HCl. The latter is probably usual. There is no venereal addiction, and no seminal losses occur. There are no cardio-vascular changes evident. Apex of heart is in normal situation. At the time of the first examination a systolic murmur was noticed, most distinct immediately below and to the left of the apex. It was also distinct in the axilla. It was inconstant, audible steadily for two or three minutes, and then not evident save

FIG. 3.



Pressure, $1\frac{3}{4}$ ounces. Pulse, 60.

with chest fixed in full inspiration. On each occasion the second sound at the apex was much accentuated. The murmur could not be distinguished when a cardiac examination was again (and last) made, several months after the first. There is no history of rheumatism. The pulse tension, when first under observation, was high. Later, after some time on a strictly vegetable diet, without meat, meat soup, fish, or eggs being eaten, it is quite normal, as the accompanying sphygmogram, one of a number similar, shows.¹ No tracings were taken before meat was abandoned.

Immediately after first sphygmogram was obtained, a meat diet was begun. Tracing second, taken one week later, indicates the effect of retained nitrogenous waste on the pulse. Meat then had been eaten somewhat freely once

¹ The upstroke is vertical, the tidal wave slight, and below a line drawn from the apex of the upstroke to the aortic notch (Mahomed's test of low tension). The pressure used was $1\frac{3}{4}$ to $1\frac{1}{2}$ ounces, a greater amount extinguishing the pulse, which was 74, taken sitting.

to twice daily. Other conditions which might modify the tracings were similar. This sphygmogram shows a typical high-tension pulse,¹ indicative of inadequate kidneys.

The eye-ground, kindly examined for me by Dr. Schneideman, shows nothing abnormal.

During the past two years the urine of different periods of the twenty-four hours has been frequently and carefully tested for albumin by heat, nitric acid, and metaphosphoric acid by the brother, who is a skilled chemist. A response has never been obtained to heat or to nitric acid. Occasionally, though more rarely than in Case I., a slight reaction has occurred to metaphosphoric acid and to picric acid; but mucin not having been eliminated, it is uncertain if the response was due to serum-albumin. Since February, 1893, the urine has been frequently tested by myself. The result has always been negative with heat and with nitric acid. On three occasions a reaction has been obtained with picric acid. In one of these only, was acetic acid used to remove mucin by the method before mentioned. On that occasion only, the untreated urine was also tested with Millard's solution. No trace of haziness or ring occurred, and after removal of mucin by acetic acid, no trace of response could be obtained with picric acid. Granular and hyaline casts have been found on several occasions. Hyaline were in excess of the granular, but even hyaline occurred only in small number, as in Case I. A few epithelia, the character of which indicated their probable origin from the convoluted tubules, were also occasionally encountered. Calcium oxalate crystals abounded in all specimens examined, whether the urine was examined immediately after voiding, or, as on some occasions, after standing twelve to twenty-four hours.

An analysis is subjoined of the most important constituents of the urine for a period of six days. The amount, specific gravity, and total daily output of nitrogen, frequently before estimated, tallies so closely with this that it may be accepted as a sample of the usual condition. These also agree, as do the clinical symptoms, with those of Case I. Uric acid elimination, however, in Case II. is somewhat higher than in Case I. The ratio to urea is 1 to 24.

Date.	Daily amount of urine passed in c.c.	Daily amount of urine passed in fluidounces.	Specific gravity of mixed 24-hour specimens.	Color.	Degree of acidity calculated on 100 c.c. urine.	Daily elimination of urea in grammes.	Daily elimination of urea in grains.	Daily elimination of uric acid in grammes.	Daily elimination of chlorides calculated as chlorine.	Daily elimination of total urinary solids in grains.	Approximate amount of fluid drunk in c.c.
1893											
Feb. 28	875	29	1026	Amber	34	13.88	200	1.0	6.75	654	800
Mar. 1	870	29	1028	"	30	14.00	215	0.646	6.50	832	800
" 2	900	30	1029	"	40	18.00	277	0.814	6.85	870	800
" 3	900	30	1030	"	Not cal.	22.50	346	0.740	7.40	900	800
" 4	900	30	1030	"	30	21.60	322	0.740	8.00	900	800
" 5	850	28 $\frac{1}{8}$	1028	"	30	22.00	338	0.828	5.50	784	800

Average daily quantity of urine, 882 c.c., or 29 $\frac{1}{2}$ fluidounces.

" " elimination of urea, 18.66 grammes, or 287 grains.

" " " " uric acid, 0.794 gramme, or 12 grains.

" " " " chlorides calculated as chlorine, 6.8 grammes.

Approximate average daily elimination of total urinary solids, 53 grammes, or 816 grs.

The following case is apparently of a type similar to the preceding, though of an age and with symptoms indicating a more advanced kidney

¹ The upstroke is less vertical, the tidal wave more pronounced, a portion of it occupying a position above a line drawn from apex of upstroke to aortic notch, which latter is placed high. Pressure from 1 $\frac{3}{4}$ to 2 ounces, no minor pressure tracing pulsations. Pulse 60; that and tracings taken sitting.

ailment. The patient came under observation while this paper was in process of preparing. I could not forbear reporting the case at this time, though not studied for a lengthy period, because of its suggestiveness. In the few days that opportunity has permitted seeing the case, it has been carefully studied. Whether the urine has been previously, as now, altogether albumin-free, or whether in the future this condition will continue, it is, of course, impossible to more than conjecture. But that it should be so now, when marked renal incompetence and symptoms referable thereto are present, renders it well worthy of mention in connection with the other cases:

CASE III.—J. MacC., aged fifty-five years; married; weight 150 pounds; stationary engineer. No history of lead, syphilis, or alcohol. First seen June 11, 1893. About a year before, he had been much overworked and had what was regarded as a slight attack of influenza. He had had no severe ailment prior to this and had always been robust. During the past nine months he had visibly failed in health. There was increasing general muscular weakness and incapacity for exertion. Generalized headache was common, and, lately, had increased in severity; it was worse toward afternoon and at night, and was associated with sleeplessness and, on rising in the morning, with vertigo. The bowels were always inclined toward constipation, but had been maintained in a soluble condition by aperients. No other digestive disturbance was present. Tongue was moderately clean. Appetite was poor. Shooting pains occasionally occurred about the body. No indications of œdema were present, nor had there ever been, so far as he could tell. Knee-jerk, station, and tactile sensation were normal. Some tremor of lips and rather pronounced of hands on extending the latter, were remarked. Temporals are prominent and radials tense, but the arterial wall was not more than slightly appreciable to the finger when emptied above by pressure. The pulse was small and gave the suggestive tracing of high tension, shown in the accompanying sphygmogram.

FIG. 4.

J. MacC. Pressure, $1\frac{3}{4}$ ounces; sitting.

The second aortic sound was markedly accentuated at the apex, but the heart's impulse was normally placed within the linea mammalis. Both palpation and percussion showed no cardiac hypertrophy. He habitually passed but a moderate amount of urine, never rising at night. The color, so far as he had noticed, is never very light.

His condition at the first visit, when the above symptoms were noted, suggested either plumbism or chronic Bright's disease. But as there was no blue line, history of colic, or other suggestive symptoms of the former, and as he had not worked at the branch of his trade for a year or more which necessitated handling lead, and no other source of exposure was evident, I informed him, on his asking for an opinion as to the nature of his ailment, that I felt confident the seat of the trouble was in the kidney. I then had him send the total twenty-four hours' urine. To my surprise not a trace of albumin could be detected by any test, even the most delicate. The urine was of normal, yellowish-red color, not resembling that of a case of contracted kidney. This, with freedom from albumin and a history of no nocturnal bladder disturbance, was misleading, and had I not been on the watch for such obscure cases and noted that not only the amount of urine but of urea was considerably subnormal, I might have been longer in arriving at an accurate diagnosis.

Careful consecutive daily examinations of the twenty-four hours' urine for albumin have been made up to the present writing. The urea, uric acid, chlorides, etc., were also calculated for a period of eleven days. Albumin, examined for daily, has at no time been present, even in the minutest trace. On two consecutive days, when the urine was especially concentrated and the weather excessively warm, a slight ring occurred with picric acid and a trifling cloud with Millard's reagent. But this was undoubtedly mucin. A second specimen treated with acetic acid,¹ filtered and neutralized with strong NaHO, and then again slightly acidulated, gave no trace of response to these tests, even after standing several hours. Considerable mucoid sediment was always present in the urine after it had stood for some hours. Two microscopic examinations were made and two to three hours occupied on each occasion. In the first examination a medium-breadth hyaline and a narrow granular cast were found. An aggregation of small cells forming a somewhat irregular-shaped epithelial cast was also seen. Free uric acid was present in large amount; calcium oxalate crystals and a few leucocytes were also noted. On the second occasion a sample of mixed urine of two days was used. A number of narrow and broad hyaline casts (eight to ten) were found. Cylindroids, amorphous urates, free uric acid crystals, a few small round and oval nucleated cells with granular contents were also present, but no calcium oxalate.

Date.	Daily amount of urine in c.c.	Daily amount of urine in fl.oz.	Sp.gr. of mixed 24-hour specimen.	Color.	Daily elimination of urea in grammes.	Daily elimination of urea in grains.	Daily elimination of uric acid in grammes.	Daily elimination of chlorides in grms. calculated as Cl.	Approximate daily elimination of total urinary solids in grains.
1893 June 12	870	29	1013	Reddish yellow	12.25	188	Not estim.	Not estim.	377
" 13	670	22	1013	"	8.78	135	0.185	1.80	289 ²
" 14	520	17 $\frac{1}{3}$	1026	"	13.00	187	0.349	4.42	350
" 15	500	16	1016	Yellow	6.50	100	0.168	2.15	256
" 16	410	13 $\frac{1}{2}$	1013	Reddish yellow	8.20	126	0.134	1.57	178
" 19	760	25	1011	Yellow	10.64	163	Not estim.	Not estim.	270
" 20	670	22	1010	"	6.70	103	0.268	1.68	220
" 21	810	27	1022	Reddish yellow	19.20	200	0.379	5.00	590
" 22	570	19	1028	Deep reddish yellow	12.50	192	0.400	4.33	532
" 23	450	15	1029	"	12.15	186	0.287	2.75	435
" 24	850	28	1017 $\frac{1}{2}$	Light yellow	17.00	261	0.340	4.00	485

Daily average amount of urine in the 11 days, 643 c.c., or 21 $\frac{1}{2}$ fluidounces.

" " " " urea in the 11 days, 11 $\frac{1}{2}$ grammes, or 177 grains.

" " " " uric acid (9 days), 0.29 gramme, or 3 $\frac{3}{4}$ grains.

" " " " chlorides estimated as Cl (9 days), 3 grammes, or 46 grains.

" " " " total urinary solids, 23 $\frac{1}{2}$ grammes, or 362 grains.

The total daily output of urine and total urinary solids in this case are much diminished. Urea is especially low.

After the eleven daily observations were made, during which the bowels were moved once daily by laxatives, 3j, three times daily, of potash bicarbon-

¹ See foot-note 1, p. 660.

² Exact estimation of the total urinary nitrogen eliminated on the 13th and 14th instant, was kindly made for me by Dr. Leffmann by the Kjeldahl-Gunning method, to compare the results thus obtained by the more ready approximate method for ascertaining total urinary solids. The figures are: 13th inst., 18 grammes or 277 grains; 14th inst., 28 grammes or 431 grains.

ate, taken effervescing with lemon-juice, was prescribed, with excellent effect, as a diuretic. This, and free purgation by calomel every third day, caused a prompt amelioration in symptoms. The pulse tension, however, continued raised, though not so markedly as at first. The accompanying tracing was

FIG. 5.

J. MacC. Pressure, $\frac{23}{4}$ ounces; sitting.

taken fifteen days after the preceding one, and two days after beginning the potash. He had then been for a week on a vegetable diet. The pulse volume is greater than in the first tracing, with a prominent pre-diastolic wave. Uric acid was then probably in excess in the blood, and nitrogenous excretion greater than before. The diuretic, mercurial laxatives, and non-nitrogenous diet being continued, recently pulse tension is considerably lower than before, with amelioration in symptoms.

The following is the report of the eye examination in this case, furnished me by Dr. Schneideman: "Vision just short of normal. Fields of normal extent for form and color. Right eye: Nerve-head reddened and somewhat hazy; outlines indistinct; marked venous pulse; maculæ normal. Left eye: Not essentially different from right. I think that the nerves are redder and more hazy than is ordinarily met with in conditions of the refraction as noted."

The accompanying case is very similar clinically to the preceding. It was recently seen in consultation with Dr. Lewis Brinton, who has kindly permitted me to report it here. From the absence of albumin, though the symptoms were suggestive of chronic Bright's disease, Dr. Brinton had been somewhat inclined to doubt this diagnosis which he has made, and sought my aid for a verification.

CASE IV.—Mrs. M., aged fifty-one years; weight about 110 pounds. Throughout her life the patient had been subject to headaches, but during the past seven years frequent spells of another character occurred. The ache is in the occiput and nucha. It comes on more often on rising, once in about five days. During the past four or five years she has had backache and loin pain; is tired on slight exertion. Occasionally puffiness about eyes has been noticed. She is very nervous. Appetite is poor. No marked digestive disturbances exist; no vomiting. Pulse shows raised tension, but no thickening of arterial coats. No cardiac enlargement exists. Heart was noted to be irritable. A distinct apical non-transmitted systolic murmur was heard in the early part of the first examination. This was evidently due to temporary incompetence. It could no longer be heard at the end of a half-hour, during which she had been sitting quietly. Dr. Brinton had not noticed it before this examination that we made together. Second sound was accentuated at the apex, more distinctly so when the murmur ceased to be heard.

She stated that she had been passing but about a pint of urine daily for some years. Could not recall ever passing a large amount, but may have averaged three pints some years ago. The specific gravity of a number of specimens examined by Dr. Brinton ran between 1012 and 1020. Dr. Brinton could never discover even traces of albumin, though he had frequently examined the urine. The specimen examined on the day of consultation was of amber color, specific gravity 1021, and gave no reaction with heat or nitric

acid, but a ring occurred with picric acid not dissipated by heat. It is impossible now to state if this reaction was due to serum-albumin or to mucin. The urine was concentrated, and but a few drops of acetic acid were added, entirely too little to precipitate mucin in presence of excess of salts.

A number of other examinations were made, a response occurring only on one other occasion to picric acid, and never to heat and acetic acid, or to nitric acid. But one microscopic examination was made. In this a considerable number of hyaline casts were seen, and one granular cast studded with minute oil globules. There were also present cylindroids, a few leucocytes, a few red cells, and several small, finely granular, nucleated polyhedral cells of apparent renal origin.

The elimination of urea, uric acid, and chlorides in this, as in the preceding case, is much below normal. Estimations could only be made over a period of a few days, but as the urine is believed to vary little in quantity, the averages here given are believed to probably represent the usual condition.

Date.	Daily amount of urine in c.c.	Daily amount of urine in fl.oz	Sp.gr. of mixed 24-hour specimen.	Color.	Daily elimination of urea in grammes	Daily elimination of urea in grains.	Daily elimination of uric acid in grammes	Daily elimination of chlorides calculated as Cl. in grammes.	Daily elimination of total urinary solids.
1893									
Apr. 27	480	16	1016	Yellow	7.00	107	0.32	2.18	256
" 28	540	18	1021	Reddish yellow	9.00	141	0.23	2.90	378
" 29	420	14	1020	"	8.40	136	0.25	1.75	280
" 30	540	18	1027	Yellow	8.60	132	.....	.....	486

Average daily quantity of urine on 4 consecutive days, 500 c.c., or 16 ounces.

" " " " urea on 4 consecutive days, $8\frac{1}{4}$ grammes, or 127 grains.

" " " " uric acid in 3 days, 0.26 gramme, or 4 grains.

" " " " chlorine in 3 days, 2.3 grammes, or $35\frac{1}{2}$ grains.

Approximate daily quantity of total urinary solids, $22\frac{1}{4}$ grammes, or 350 grains.

Ratio of uric acid to urea, 1 to 31.

The next case, V., also resembles the foregoing. She was first seen during last May in the dispensary of the Episcopal Hospital. Since then she has been constantly under observation, for a time in the wards of the hospital.

CASE V.—Miss R. L., aged seventeen years, of delicate build; weight, 110 pounds. The symptoms of her ailment first noticed were that for the past two years there has been almost constant loin pain, with frequent spells of vertigo and headache. She was losing strength and was unable to attend to daily duties. There was anorexia and a feeling of weight in the epigastrium after meals, and constipation. When aged six years had had scarlatina, during the subsidence of which slight general dropsy occurred, lasting about a week.

FIG. 6.



R. L. Pressure, $2\frac{1}{4}$ ounces; sitting.

When first seen she was of anæmic appearance. For a year or more she had not been getting the proper sort or amount of food because of the straitened circumstances of her people. An examination showed no cardiac hypertrophy. The first sound of the heart was distinct at the apex and the second

was there accentuated. The pulse was rapid, and furnished the subjoined tracing, one of several, all showing a similar condition of low tension and well-marked dicrotism with the aortic notch low.

Fig. 7 shows a tracing taken three weeks later, after a week spent in recumbency in hospital on soft diet (chicken once daily). In this tracing it

FIG. 7.



R. L. Pressure, 2 ounces; sitting.

will be noticed that tension is higher, the pre-dicrotic as well as the dicrotic wave being quite well marked. Rest in bed and a more wholesome diet had evidently increased arterial tone.

During the two and a half months that she was under observation no drugs were given; a mild laxative was prescribed. An accurate record was kept of the daily quantity of urine for over one month. The average was 550 c.c. (eighteen fluidounces). More or less loin pain, and spells of headache and vertigo continued throughout this time. These symptoms have since ameliorated somewhat under free purgation and large doses of potassium citrate, the last given to stimulate diuresis.

The urine in this case always deposited considerable mucoid sediment, and a reaction was obtained on three occasions to picric acid, and on two a slight cloud was evident on cooling after boiling a specimen slightly acidulated with acetic acid. This was evidently due to the presence of mucin, as a specimen subsequently treated with *excess* of acetic acid, in the manner before described, gave then no trace of albumin response to any test.¹

In three microscopic examinations casts were found on two occasions, once by Dr. Frank Massay, who kindly made an examination for me. Dr. Massay noted pale granular and hyaline cylinders of medium breadth, and cylindroids. In a later examination by myself, broad and narrow hyaline casts only, were seen. Calcium oxalate crystals were present in very large quantity in all examinations.

The figures in the accompanying table indicate that urea elimination in

Date.	Daily amount of urine in c.c.	Daily amount of urine in fl.oz.	Sp.gr. of mixed 24-hour specimen.	Color.	Daily elimination of urea in grammes.	Daily elimination of urea in grains.	Daily elimination of uric acid in grammes.	Daily elimination of chlorides calculated in grms. as Cl.	Daily amount urinary solids in grains.
1893 Apr. 30	400	13	1031	Reddish yellow	14.40	221	Not estim.	Not estim.	403
May 16	400	13	1029	"	15.00	225	0.3	2.38	377
" 17	380	12 $\frac{3}{4}$	1031	"	10.00	154	Not estim.	2.00	395
June 11	440	14 $\frac{2}{3}$	1031	"	16.75	255	"	Not estim.	352
" 12	470	15 $\frac{2}{3}$	1032	"	22	338	"	"	500
" 13	480	16	1033	"	18.25	280	"	"	528

Average daily amount of urine in the 6 days recorded above, 430 c.c., or 14 fluidounces.

" " " " urea in the 6 days, 16 grammes, or 246 grains.

Approximate daily amount of total urinary solids in the 6 days, 27 grammes, or 424 grains.

¹ This case has, of course, been under observation for too short a time, and too few examinations for albumin have been made to permit it, like Cases III. and VI., to be more than suggestive. Albumin may only have been absent for a time in the course of the chronic malady from which she is undoubtedly suffering. It is, however, significant that with small amounts of urine, with the presence of casts, and symptoms indicating renal incompetency, albumin was at least *then* absent.

this case is considerably diminished. The average daily amount for her weight should be about 350 grains, against the 246 noted. But one examination for uric acid was made. This ($4\frac{1}{2}$ grains) showed diminution. Chlorine elimination, too, as shown in the two examinations, is considerably below the normal, which would account for the ratio of urea to the daily amount of total solids being less than the usual one-half.

The next case is interesting in that, with few symptoms suggestive of chronic Bright's disease, renal degeneration in all probability exists. It was seen through the kindness of Dr. de Schweinitz, under whose care the patient was for failing vision. A renal ailment was not especially suspected by Dr. de Schweinitz, who had examined several specimens of urine for albumin with negative result. A cause for the symptoms—"chronic headache, with a curious form of optic neuritis in one eye and some degeneration in streaks in the other," as reported to me by Dr. de Schweinitz—not being apparent, he had sent the total twenty-four hours' urine to me for examination. On the urea being found somewhat diminished and casts being detected in the urine, I was permitted, through the courtesy of Dr. de Schweinitz, to see the patient on several occasions and to make further examinations of the urine.

CASE VI.—Mrs. T., aged fifty-one years; widow; seamstress; weight, 150 pounds. Had influenza two years ago. Following that has been subject to severe headaches, chiefly about vertex and frontal region. Has been subject to vertigo for a number of years. At times it is so severe that she has almost fallen with its occurrence when on the street. She has had more or less loin and sacral pain for some years, aggravated by being much on her feet. A tendency to constipation has always existed. No other symptoms are present save that eyesight began to fail unaccountably some months ago. That, lately, has improved under Dr. de Schweinitz's treatment. She never has passed large quantities of urine. Cannot recall how long the small amount now voiding has been habitual.

A cardiac examination showed a strong first sound and a highly accentuated apical second sound. No enlargement was detectable. Apex-beat was in normal situation. Pulse tension was high, but after radial was emptied by pressure, arterial wall scarcely distinguishable. Temporals not prominent. Considerable pressure necessary to develop tracing, but sphygmograms taken with from $2\frac{3}{4}$ oz. pressure up to $3\frac{3}{4}$ oz. similar; 4 oz. causes rounding of apex of upstroke. The accompanying tracing, with which others,

FIG. 8.

Mrs. T. Pressure, $3\frac{3}{4}$ ounces; sitting.

taken with the same degree of pressure, on this and other occasions are similar, is very significant, and by it alone a diagnosis of probable renal degeneration might be made. Though there is no history of lues, and nothing to definitely indicate a present or past infection, Dr. de Schweinitz is inclined to regard the eye condition¹ as of *specific* origin, especially since improvement

¹ Dr. de Schweinitz's report is as follows:

"Central vision, after the correction of an astigmatism, 6/6; field of vision for form normal, slightly contracted for colors. In the right eye iris somewhat sluggish to the reactions of light and shade; moderate optic neuritis, the apex of the swelling being 1 D. above the level of the surrounding eye-ground, the grayish swelling being chiefly confined to the disk; no hemor-

in this has been decided while on anti-luetic treatment. However that may be, there is little doubt that an underlying kidney ailment is contributory to certain of the symptoms.

There were indications of albumin to picric acid in the first specimen of urine examined, acetic acid not being used to separate mucin. The urine was concentrated, and deposited, after a few hours' standing, a heavy cloud of mucus and oxalates, to the former of which the reaction may have been due. No response of any sort occurred with subsequent specimen. But one specimen was examined microscopically. Several hours' search of five slides revealed three typical granular casts, one long, very typical waxy cylinder and a number of pale, broad hyaline casts. There were also present small polyhedral nucleated granular cells, bladder and vaginal epithelium, a few leucocytes and red disks, and a profusion of calcium oxalate and uric acid crystals.

The urea elimination in this case is more diminished than is that of the preceding. The amount calculated for body-weight should be from 400 to 450 grains, while there is actually excreted but about one-half this, or 230 grains. The total urinary solids excreted do not much exceed what the figure for urea should be were the renal tubular structure doing full work.

Date.	Daily amount of urine in c.c.	Daily amount of urine in fl.oz.	Sp.gr. of mixed 24-hour specimen.	Color.	Daily elimination of urea in grammes.	Daily elimination of urea in grains. ¹	Daily elimination of uric acid in grammes.	Daily elimination of chlorides calculated in grms. as Cl.	Daily amount total urinary solids in grains.
1893 May 5	480	16	1031	Reddish yellow	16.80	258	Not estim.	Not estim.	496
" 10	553	18	1030	"	15.00	237	0.57	5.50	540
" 11	490	16 $\frac{1}{3}$	1030	"	14.00	215	0.43	3.80	490
" 12	465	15 $\frac{1}{3}$	1030	"	15.00	225	Not estim.	2.19	460
" 13	500	16 $\frac{2}{3}$	1030	"	15.00	225	0.50	Not estim.	500
" 14	470	15 $\frac{2}{3}$	1032	"	14.00	215	0.40	4.11	470

Average daily amount of urine, 500 c.c., or 16 $\frac{2}{3}$ fluidounces.

" " " " urea, 15 grammes, or 230 grains.

" " " " uric acid, 0.47 $\frac{1}{2}$ gramme, or 7 $\frac{1}{2}$ grains.

" " " " chlorine, 3.90 grammes.

Approximate average daily amount of total solids, 32 grammes, or 493 grains.

Ratio of uric acid to urea, 1 to 31 $\frac{1}{2}$.

In addition to the foregoing cases, through the courtesy of Dr. Charles A. Oliver I am able to report one, followed to its termination, in which albumin was evidently totally absent from the urine throughout the course of the disease. This case was originally sent to Dr. Oliver for an eye examination. No suspicions of renal trouble had been entertained until the fundal changes were noted.

rhages or splotches. In the left eye, a vertically oval optic disk, gray in its deeper layers, the upper and lower edges hidden and the nasal edges veiled; a patch of atrophic retino-choroiditis up and out from the papilla, numerous glistening reflexes in the macula, and above the fovea some dark radiating streaks, apparently in the retina. Under the influence of iodide of potash and bichloride of mercury, in dose of 5 grains and 1-24th of a grain respectively, three times a day, the appearances of the eye-grounds steadily improved, and at the last visit, May 23, 1893, one month after instituting the treatment, the disk upon the right side was less swollen, the temporal edge being visible. The disk upon the left side had improved in appearance, but there was no change in the patch of choroiditis or in the macular lesions."

¹ The urea determinations in this case were kindly made for me by Dr. Leffmann.

Dr. Oliver has furnished me the following note of this case:

"Miss X., aged nineteen years, an apparently strong and healthy girl of refinement and education, without any hereditary taint, was sent to the writer by her attending physician for recurrent frontal cephalalgia, associated with muscular and accommodative asthenopias. Careful examination of the fundus oculi showed the existence of a few faint flecks and dots in each macular region. So highly significant of renal disease were these changes, that the medical adviser was warned as to their nature. Repeated chemical and microscopic examinations of samples of urine, voided at different hours of the day and under varying conditions, up to within one week of her death (the last examination), failed to reveal either to her physician, the writer (Dr. Oliver), and more competent authority, any albumin, tube-casts, or other characteristic organic or mineral excreta—the specific gravity always remaining about normal. In spite of these negative results, low grades of neuro-retinitis, with and without fine spray-like hemorrhagic extravasations, came and went, until in about seven months after her eye-grounds were first studied, a uræmic attack suddenly appeared after exposure to cold, resulting in coma and death. Post-mortem examination revealed the presence of granular kidneys, with cardiac hypertrophy.

"In reference to your inquiry as to the tests for albumin employed, I would state that, in every instance in which I examined the urine, the specimen was filtered and boiled, followed by the careful and slow addition of either nitric acid or acetic acid; this method was invariably followed by Heller's test, both by superimposing the urine upon the acid, or allowing the acid to flow drop by drop beneath the urine along the inclined test-tube. In quite a number of instances I supplemented this by the application of heat, proving the presence of acid urates, which I afterward confirmed by the microscopic appearances of the ordinary six-sided rhombs. The specific gravity in some of these latter specimens, I remember, was somewhat high—1024.

"The specific gravity of the urine never fell below 1016, and 1024 was the highest."

Since beginning this investigation specimens of urine have been submitted to me from several cases of undoubted chronic Bright's disease in which the accompanying symptoms and the presence in three of so-called "albuminuric" retinitis had rendered the diagnosis very clear. In these, changes in the fundus were present in all, and considerable hesitancy had been felt by the medical attendants in accepting the opinion of the oculists as to the probable renal nature of the retinal condition, because of the absence of albumin. In two of these cases albumin had been frequently examined for by heat and by nitric acid, over a long space of time, but never found; and casts had not been detected, save a single hyaline cylinder on one occasion in the urine of one of these. These examinations of the urine had not been made for some time when daily specimens of the twenty-four hours' urine were submitted to me. Examinations for urea and uric acid over some days, as in the preceding cases, were instituted, the result of which need not be detailed here. In one, a senile case, passing scanty, light-colored urine, of low gravity, out of five specimens of the mixed twenty-four hours' urine examined, response for albumin occurred twice; on one of these occasions to acetic acid and potash ferrocyanide, and, slightly, to heat and acid—these two tests were then the only ones used. No casts could be detected in two exam-

inations, no sediment being obtainable even with the employment of the centrifugal machine.

In the other case, under the care of the same physician, out of eight specimens examined on different days, response to albumin occurred twice; on one occasion only to the more delicate tests, and on the other slightly also to heat. Epithelial and granular casts were found in the urine of this patient. Since these examinations the physician reports detecting albumin on a single occasion by nitric acid, and also by heat. Because of the even occasional presence of albumin in these cases I have not included them in my list. Both pass a diminished amount of urine, but are without dropsy. Slight uræmic symptoms are present. The arterial tension in both is habitually high. In one, cardio-vascular changes are present. In the other, aged but thirty-two, no arteriosclerosis exists.

One other case of which I have notes, in which retinal changes occurred without albuminuria, is interesting and may here be briefly referred to. This I recently saw through the courtesy of Dr. L. Wolff.

Symptoms of digestive disturbance had at first alone been complained of. For these, the patient, a woman aged fifty years, was treated by Dr. Wolff. Subsequently, when not under the Doctor's care, her eyesight began to fail markedly. She then sought the eye dispensary of St. Agnes's Hospital for relief. The attendant there told her the trouble was renal, advising her to seek her physician, that her urine might be examined. Repeated search was then made by Dr. Wolff for albumin, without result. Examinations were then also made by the oculist, who was unable to understand the absence of albumin with such symptoms. It is needless to state that his search at the time of Dr. Wolff's examinations was also resultless. Later, Dr. Wolff lost sight of the case, but recently sought her out for my benefit. We found her suffering with pyelitis, which prevented the further study of the kidney condition from the point of view of absent albumin.¹

As to the probable pathological nature of the kidney lesion in the preceding cases the histories of which I have detailed, little more than conjecture is possible. Clinically, they form a very similar class of various stages of a common ailment. Three of the six are young adults, and three in middle life. All present certain common symptoms which are referable to derangement of the renal functions, such as headache, vertigo, loin pain, high-tension pulse, diminution in the amount of urine, and in the most important of its constituents; the presence of casts, hyaline, granular, and waxy, and of isolated renal epithelia; the absence of albumin and of dropsy.

Detectable cardiac enlargement, hypertrophy, or dilatation, is absent in all, and thickening of vessel wall is recognizable in but one (Case III.), although raised arterial tension, save on a strictly non-nitrogenous diet, is habitual in all save Case V.

¹ Dr. Wolff informs me, as this paper is going to press, that she recently died suddenly. No autopsy was obtained.

It may be said that the assemblage of symptoms presented by these cases, is typical of no distinct form of chronic nephritis, though their trend is suggestive of granular or cirrhotic kidney, or of the form described by Delafield¹ in his pathological classification of renal disease, as chronic diffuse nephritis without exudation.

The only form of chronic Bright's disease of which we have knowledge in which the urine may be persistently albumin-free, is this or the red, granular or cirrhotic kidney. Yet several, as regards age and absence of cardio-vascular changes, and all as regards diminution in the amount of urine habitually passed, with coincident more or less marked diminution in elimination of urinary solids and especially of urea, do not respond to the type of so-called fibroid kidney. But that fibroid changes are present in the kidney in all, accompanying whatever other alterations that may exist, there is probably little doubt.

As regards epithelial involvement, the absence of albumin, of dropsy, and of epithelial casts, are against any extensive affection of the tubules; yet the presence in the urine in all of tubular epithelium, of granular, numerous hyaline, and, in one, of waxy casts, and the marked diminution of urinary solids, indicate some involvement of these parts, though perhaps not as yet to a degree more than what may be termed *functional*.

Glomerular nephritis of pronounced type is quite impossible without albuminuria, yet glomerular changes, of the nature of thickening of capsules of tufts and of vessels, are not improbable,² and may account for diminution in amount of urine, a symptom in all, and especially in Case V., a young girl in whom scarlatinal dropsy occurred when aged six years, and in whom also, now, slight ephemeral disseminated œdema of the skin occasionally occurs.

Little further comment need now be made on these cases, the purpose of this paper not being subserved by mere speculation. It is not claimed for them that the urine is perpetually albumin-free, or that it will remain so to the end, as in Dr. Oliver's case. The present report is intended but as preliminary, to direct attention to a very similar class of cases of chronic Bright's disease apparently of not uncommon occurrence, in which during the period of observation albumin has been invariably absent to ordinary tests, and usually to those most refined—at a time, too, when marked indications of renal derangement have been evident.

Subsequently a further report on these cases will be made, with such others similar as I may be able to encounter and study. My one object now, to which all other thoughts are subordinate, is to direct especial

¹ AMER. JOURN. MED. SCIENCES, October, 1891.

² Mahomed believed that absent albumin in certain cases of chronic Bright's disease may be due to thickening of vessels of Malpighian tufts, through which it is difficult for albumin to transude; and also to thickening of the capsules of the tufts, preventing distention of vessels; and again, though less often in chronic Bright's disease than in acute, to protective contraction of the renal artery.

attention to this class of cases, the pathological classification of which will readily come when they obtain general recognition clinically.

The most important teaching of this paper, to which all should give heed, is that there is no doubt that but little stress can be laid on the mere absence of albumin from the urine in rejecting or confirming a diagnosis of chronic Bright's disease; that in any instance in which an examination for albumin is demanded as a part of an investigation to detect or exclude kidney disease, no decided opinion dare be ventured as to the absence of the latter without further search of the urine, to determine not only the mere presence or absence of morphological kidney elements,* such as casts or epithelium, but also to discover the condition of the secretory renal function. As the latter can only be determined by an examination of a mixed twenty-four hours' specimen of urine, the total daily amount passed must be known. It should, therefore, be a rule, admitting of no deviation, in all cases of suspected Bright's disease in which albumin is undetectable in a single unmixed specimen, to obtain that of the total of one or, better, a consecutive series of twenty-four hours. Then, too, when albumin is absent in a single unmixed specimen, it may sometimes be discovered in that of the total twenty-four hours, when the more delicate tests are intelligently employed.

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TUBERCULOSIS OF THE NASAL MUCOUS MEMBRANE; WITH A REPORT OF TEN NEW CASES.

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LESS than two decades ago tuberculosis of the nasal mucous membrane was a subject almost unknown to medical writers and observers. Men of such extensive experience as B. Fraenkel and Sir Morell Mackenzie confess that they have never seen a case. The former (see¹, bibliography) states that he thinks "tubercular ulcerations in the nose are of the utmost rarity," while the latter² admits that he probably has overlooked some cases of tuberculosis of the nasal mucous membrane among those

* Nor should these be excluded until a search of sediment, obtained by the use of the centrifugal machine, is made. Notwithstanding it is accepted that the mere presence of hyaline and granular casts, though highly suggestive, is not pathognomonic of an actual coarse kidney lesion, their presence in the urine always indicates at least functional disturbance of the kidney; and when not due to alterations in blood-pressure (congestion and associated albuminuria) and when accompanied by the presence in the urine of renal epithelium, or when associated with symptoms of renal inadequacy and persistently raised blood-pressure, it may be safely asserted that chronic nephritis exists.

many thousands of cases of laryngeal phthisis which he has seen. During the last ten or fifteen years, however, our knowledge of tuberculosis of the nasal mucous membrane has been extended by a number of contributions, which become more frequent the more our attention is directed to this affection. Richard von Volkmann,³ the celebrated German surgeon, from his clinical observations and from theoretical deduction, stated that he believed that a number of tubercular affections of the nose are generally overlooked, or rather incorrectly diagnosticated. He points out that certain forms of ozæna believed to be due to congenital lues are most probably of a tubercular nature. Hajeck⁴ was the first who succeeded in proving this assertion of Volkmann, by finding tubercle bacilli in the granular masses removed in cases of nasal affections which presented such clinical features that they would—without the bacteriological investigation—have been classified under the head of ozæna. It even looks as if tuberculosis of the nasal mucous membrane is not confined exclusively to the human race, and that we may eventually find it among the monkeys, who, as is well known, are very susceptible to pulmonary tuberculosis. Shurly⁵ reports such a case of probable nasal tuberculosis in a monkey.

If we collect all cases of tuberculosis of the nasal mucous membrane reported in medical literature up to date, the total number, compared with the enormous number of other tubercular affections in other parts and organs of the human body, appears very small. Undoubtedly the nose is an organ which possesses a high degree of immunity against the tubercle bacillus. While the nasal mucous membrane is not endowed with an absolute and universal resisting power against each and every pathogenic micro-organism—we may here only mention how frequently it is attacked in the course of true bacillar and in streptococci diphtheria—it is, on the other hand, by no means immune against Koch's bacillus exclusively. There are very few well-authenticated cases of gonorrhœa of the nasal mucous membrane on record. Ricord has never seen one, and Diday, who has experimentally tried a large number of times to inoculate the nose with gonorrhœal pus, has failed without exception to produce a gonorrhœa of the nose.

Cornet⁶ has shown that it is the dried and pulverized sputum of phthisical patients which furnishes the source of infection for tuberculosis of the lungs, by being inhaled into the respiratory tract. The parts which necessarily in normal respiration come in contact first with the tubercle bacilli inhaled are the nasal mucous membranes. Still, tuberculosis of these structures, not only as a primary disease but also as a secondary affection in phthisical subjects who expectorate hourly millions of bacilli, and consequently are constantly exposed to auto-infection, is a rare condition. Hildebrand,⁷ by animal experiments, has demonstrated how important a factor the nose is in preventing micro-organisms from penetrating

into the lower parts of the respiratory tract. He compelled two rabbits of equal size to breathe, for three-quarters of an hour, air impregnated to a moderate degree with spores of *aspergillus fumigatus*; one rabbit was allowed to breathe *per vias naturales*, while the other one, whose mouth and nose had been closed up, was compelled to breathe through a canula introduced into a tracheotomy wound previously made. When a post-mortem was held on both rabbits, four days later, it was found that the two upper lobes of the right lung, and one upper lobe of the left lung of the animal on which a tracheotomy had been performed, showed the characteristic hepatization due, as first shown by Lichtheim,⁸ to the invasion of the micro-organisms used in this experiment, while both lungs of the rabbit which had been allowed to breathe *per vias naturales*, through the nose, were perfectly free from any pathological changes, and could be inflated perfectly, like any other apparently normal lung.

Hildebrand, from these and other experiments, concludes that the micro-organisms suspended in the air we breathe, do not normally get into the deeper parts of the respiratory tract, but are kept back by the nose and naso-pharynx. It is evident that if these parts have the function of keeping back from the lungs pathogenic micro-organisms suspended in the air, they must necessarily be endowed with such properties as to make innocuous or remove such micro-organisms. Nature, in the phylogenetic development of the upper parts of the respiratory tract in higher animals, could not create an apparatus which should have the function to keep back inimical elements, without also investing it with the power to destroy or get rid in some way of these dangerous, unwelcome guests. Robert Koch,⁹ indeed, stated, in one of his first publications concerning the etiology of tuberculosis, that the tubercle bacillus, if it has entered the respiratory tract, is usually removed by its ciliated epithelium. Cornet¹⁰ points out that not only the ciliated epithelium, but also the current of mucus forms a potent physiological safeguard against the inroad of bacilli. The upper parts of the respiratory tract are endowed either with ciliated epithelium or with pavement epithelium in a thick layer; a few spots only of parts more or less in relation with the upper air-passages are devoid of any epithelium whatever, but here we have a strong constant double current of leucocytes—one current toward the interior, one directed outwardly. It is the function of the latter to destroy micro-organisms coming in contact with the parts so protected.¹¹ These are all, as we see, provisions to prevent foreign obnoxious elements from either entering the deeper parts of the respiratory apparatus, or getting into the substance of the structures forming the upper parts. That this is effectually accomplished, as far as the tubercle bacillus is concerned, is proven by the comparative rareness of tubercular affections of the pharyngeal¹² and nasal mucous membranes.

While, as stated above, tuberculosis of the nasal mucous membrane is

a subject which has only received recently the attention it deserves, this pathological lesion has been mentioned centuries ago, already by no less a medical genius than Morgagni,¹³ who put a case on record from the post-mortem table, stating that it showed tubercular ulcerations of the upper parts of the pharynx, extending thence to the velum palati, and *from the latter to the nasal mucous membrane*. Bayle¹⁴ must have seen tubercular ulcerations of the nose, because he says: "*Qui occupent assez souvent la bouche, le pharynx et même les fosses nasales des phthisiques . . . je soupçonne que cette affection tient à la diathèse tuberculeuse.*"

The first more modern case of tuberculosis of the nasal mucous membrane was recorded by Willigk,¹⁵ who, in his report of 1600 autopsies made at the Prague Pathological Institute from 1850 to 1852, comprising 476 individuals tuberculously infected, found one male with tuberculosis of the septum narium. Further details are not given in this case. The next case of which we read in literature is the more interesting, as it is one of tuberculosis of the upper air-passages (above the larynx) *without any affection of the lungs*. On November 16, 1875, W. Fairlie Clarke¹⁶ exhibited before the meeting of the Pathological Society of London, Eng., a specimen of what he called tubercular lupus of the tongue, palate, and gums, taken from a male patient, eighteen years old, a bricklayer, who died at the West London Hospital, from inanition, the tubercular affection having finally prevented him from taking any food. It is further stated in the post-mortem report that the mucosa of the nose was thickened and ulcerated. The case was diagnosticated *intra vitam* as one of tuberculosis by Sir James Paget. Mention is made in the post-mortem report, that the lungs were entirely free from any pathological changes. The next cases are reported by Laveran,¹⁷ in 1877, and during the next twelve years quite a number of additional reports of cases came forth, so that Mertens,¹⁸ in 1889, in a dissertation made under the direction of Dr. Otto Seifert, Chief of the University Polyclinic for the Diseases of the Nose, Buccal Cavity, and Throat, at Wuerzburg, was able to give a collection of thirty-one cases, in which collection, however, two of the older cases were not included.

Including ten new unpublished cases, a history of which will be given presently in this paper, I am able to now tabulate from literature eighty cases of tuberculosis of the nasal mucous membrane. This number does not include a few more case-reports recently published in medical periodicals and annuals, which are at present not accessible to me, namely, cases published by Hajeck,¹⁹ Maracék,²⁰ and Heryng,²¹ two cases of which absolutely no details are given, and of which Scheinmann²² only states that they were greatly benefited by a course of pyoktanin treatment, nor, finally, nine cases by Capart,²³ who says that

he has seen twelve cases of nasal tuberculosis, but only gives details of three of them.

The new cases published in this paper came under observation since 1889 (after the publication of Mertens' paper), at the Wuerzburg Polyclinic, except the last one, which was seen by the author after his return from Germany, in his private practice at Cincinnati, Ohio. The following is an abstract of the history of these ten cases:

CASE I.—This case has been reported in literature before; it was one of Mertens' (*loc. cit.*) cases which again came under observation and treatment later on. It well illustrates the chronic course of tuberculosis of the nasal mucous membranes and its tendency to lead to frequent relapses of the pathological process in spite of energetic surgical interference.

E. S., female, born in 1868. States that she has been the subject of some eye trouble in the left eye (dacryocysto-blennorrhœa) for eight years. She now (1886) complains that the left side of her nose is stopped up, so that she cannot breathe through it. The examination of the nasal cavities shows an hypertrophic left lower turbinated covered with granulations which bleed easily. December 31st, the granulating hypertrophies were removed by the cold snare. On February 10, 1887, the operation wound, after several cauterizations with chromic acid, and after a prolonged course of iodol insufflation, had cicatrized. June, 1888, the patient presented herself again with suppurating cervical glands. They were removed and found to be tubercular. Nasal cavities apparently in normal condition. February 4, 1889, the patient again complained about the stopping up of the left side of the nose. The trouble began, as patient states, about eight weeks before. Examination showed that the left lower meatus was completely obstructed by a granulation tumor. This tumor was removed, and a very few tubercle bacilli were found in sections made from it. The patient, after some time, ceased to attend. (So far, the case has been reported already by Mertens.)

January 23, 1890. Patient again makes her appearance at the clinic; she again complains that the left side of her nose is stopped up. Other cervical glands are suppurating. The examination shows granulating masses springing from the left lower turbinate filling up the lower and the middle meatus. A posterior rhinoscopic examination shows thickening of the septum at the posterior nares on both sides. Tongue and mucous membrane of cheeks normal; teeth sound; larynx normal. The tubercular masses in the nose were removed, and the suppurating cervical glands extirpated. The patient soon again disappeared, before the open surfaces in the nose had healed up.

CASE II.—A. V., aged twenty-six years, female, servant-girl. This patient has been under treatment before for lupus faciei, and lupus mucosæ nasi. She now presents a lupus at the inner canthus of the right eye. On the left surface of the septum there is seen a small exostosis, opposite to which there is a small ulceration on the lower turbinated bone. The naso-pharynx is filled with dried-up crusts. Tongue coated, several teeth necrotic, larynx normal.

March 13, 1890. Cauterization of the ulceration with acidum trichloracetum; aristol insufflation.

15th. Repeated cauterization with acid. trichloracet.; aristol insufflation.

20th. Cicatrization complete; patient dismissed from treatment.

June 30. Patient, who has been for eight days under treatment at the eye clinic, makes her appearance again. On the floor of the right nasal cavity a new ulcer has appeared, likewise on the middle of the right lower turbinated bone on the same spot where formerly an ulcer had been situated. The ulcerations were scraped with the sharp spoon, and the bleeding surface was treated with pure lactic acid.

July 10. Wounds healed up; patient dismissed from treatment.

November 7. Patient makes her appearance again. The right nasal cavity at its floor shows granulations, on the left side the lower turbinated bone

shows ulcerations. Old lupus of the ductus naso-lachrymalis on the right side, fresh lupus of this duct on the left side. The treatment consisted in the same measures adopted before; besides, on December 1, 1890, the patient received a tuberculin injection. Typical reaction of the lupoid ulcerations on the face, etc., and on the nasal mucous membrane where the ulcerations were situated. After the third injection of tuberculin all of the ulcerations were healed up, on December 13th; on December 20th there were again new ulcers showing themselves. After eight more tuberculin injections all was again healed up. February 17, 1891, no more reaction after tuberculin injection. February 24th, a small ulceration on the left lower turbinate bone again visible, which was treated with lactic acid. The patient did not make any further attendance.

CASE III.—H. E., aged twelve years, came to clinic again March 17, 1890; he had been previously treated (about one year before) for tuberculosis of the nasal mucous membrane, and an ulcer on the right lower turbinated bone. When the patient came under observation again, on above date, the lymphatic glands of the neck, especially those situated below the inferior maxilla, were all enlarged; lungs normal. The lower free margin of the inferior turbinated bone presented a small ulcer. Naso-pharynx smooth; in the middle of the pharyngeal tonsil a long cleft presented itself. Tongue smooth, papillæ normal; lingual tonsil slightly hypertrophic. Ulcer cauterized with acid. trichloracet.

27th. Repeated cauterization.

April 10. Ulcer healed.

25th. Patient dismissed.

July 1. Patient again came up for treatment. Ulcer on the floor of the right nasal cavity; on the septum cartilaginum and on the right lower turbinate, profuse granulations everywhere in ulcerations. Scraping with sharp spoon; cauterization with lactic acid.

10th. The ulcers have not yet healed; new granulations have appeared. Treatment as before.

25th. Ulcerations healed. Patient instructed to introduce into his right nasal cavity, daily, a tampon saturated with equal quantities of balsam of Peru and glycerin.

March 18, 1891. Patient, who has been feeling perfectly well until about two weeks ago, complains about the formation of crusts in his nose. An examination reveals ulcerations and granular masses at the places where they had been previously observed. Therapy as before.

April 12. New granulations removed.

June 3. New granulations removed.

October 1. Patient had not come to the clinic for a number of weeks. His mother got impatient, and took the boy away from town to the home of Rev. Pfarrer Kneipp, who examined him, pronounced his case one of nasal polypi, and ordered "Zinnkrautthee and Knieguesse." The patient now shows extensive ulcerations, and the septum is perforated. Therapy as before; euphron insufflation.

March 5, 1892. During the last week a shallow ulceration has appeared on the lower margin of the right nasal bone. The sound introduced into this ulceration can be felt from the outside through the external integument. Therapy: Opening of the nasal cavity during chloroform narcosis; scraping with sharp spoon.

18th. Incision wound healed; more granulations removed.

October 25. Several times small granular masses were removed since the last extensive operation. The general condition of the patient has improved materially. He looks well; the cervical glands are normal in size and consistency. The ulcerations in the right nasal cavity are healed; only a few granulations remain on the right lower turbinate. They were removed with the sharp spoon.

CASE IV.—May 5, 1891. A. N., aged twenty-six years; farmer's daughter. Has been treated for three years for tuberculosis of the nose. Patient of medium size, of strong build; submaxillary glands indurated; cicatrices of former glandular suppuration. On the left side of the septum, beginning

near the anterior nares and extending to a good distance posteriorly, an ulceration is seen, of an uneven surface, irregular outlines covered with thick granulations. These granular masses at the anterior margin of the ulcer form a small tumor. Another small tumor is seen on the inferior turbinate on the same side, which is of a dark-red color and bleeds easily. Larynx normal. Removal of the tumors by means of the cold snare and cauterization with acid. lactic. pur.

June 2.—Patient shows again an ulcerating surface on the septum. The ulcer cauterized with lactic acid.

6th. Ulcer on the septum almost completely healed. The lower turbinate is free from any ulceration.

CASE V.—K. Z., aged thirteen years, female. Patient thin, anæmic; tuberculosis of the ductus naso-lachrymalis on both sides; the ducts are laid open by ulcerations. Lungs do not give any signs of pathological changes. On the floor of the right nasal cavity, near the ostium nasale of the lachrymal duct, opposite the right middle turbinate, a tuberculous shallow ulceration. An ulceration of the same kind on the anterior end of the left lower turbinate. Naso-pharynx and buccal mucous membrane, normal; larynx normal. The ulcerations were cauterized several times with lactic acid. Patient soon disappeared.

CASE VI.—September 4, 1890. F. S., pianomaker, aged fifty years, male; had been under treatment before for nasal trouble. In fair general condition of health; dulness over right apex. Nasal mucous membrane on left side reddened but not thickened, dry; on the right side a tumor of the size of a hazel-nut, springing from the middle turbinate, appears. The tumor has a granular surface, is of a grayish-red color, of soft consistence, and bleeds easily. The tumor can also be seen to some extent by posterior rhinoscopy.

18th. The larger part of the tumor removed by the cold snare.

19th. The stump removed by the sharp spoon.

CASE VII.—October 9, 1890. R. Q., aged thirty-one years, male, a glass-worker. Large, stout, and healthy; lungs normal. On the left side of the septum, opposite the left inferior turbinate, an easily bleeding ulceration covered with tubercular granulations. They were removed with lactic acid. The patient soon disappeared.

CASE VIII.—S. P., aged forty-nine; farmer's wife. Has been suffering from a dacryocysto-blennorrhœa for two years, and from catarrh and stopped-up nose for one year; weakly built female. Ulcerating tubercles, ulcerations, and granulations are seen on the inner side of the right ala of the nose. The tip of the nose also shows tubercles.

May 5, 1892.—The granulations were removed by the sharp spoon. An iodoform tampon introduced.

23d. Repeated scraping with sharp spoon. Emplastrum hydrarg. applied to the tip of the nose.

June 1.—The wounds on the inner side of the ala have become cicatrized. A few new granulations around the perforation in the cartilaginous septum. Granulations are also now seen on the floor of the nasal cavity and on the lower turbinate. They were all removed by the sharp spoon.

28th. The nodules on the tip of the nose have disappeared; the skin over it is perfectly smooth. New granulations on the floor of the nasal cavity and on the lower turbinate. Removal by sharp spoon.

October 19. Tip of nose normal in appearance, also ala and anterior nares. Mucous-membrane of interior shows smooth cicatricial tissue; perforation shows smooth margins.

CASE IX.—June 6, 1892. C. P., aged twenty-one years, male. No complaint about nose; healthy-looking; lungs normal. One sister died of pulmonary tuberculosis. No swelling of cervical or any other lymphatic glands. On the middle of the lower turbinate bone of left side a roundish tumor of the size of a hazel-nut, grayish-red in color, easily bleeding on being touched with a nasal sound. Larynx normal. Tumor removed. Patient did not return.

A few of these histories may, perhaps, appear to the critical reader somewhat short—too meagre to make on their showing a diagnosis of tuberculosis of the nasal mucous membrane. It may also elicit some doubt whether it is really correct that in a town of the size of Wuerzburg, within a few years, such a comparatively large number of cases of tuberculosis of the nose should have come under observation. It may be stated, however, that in Wuerzburg, as well as in the surrounding smaller places dependent for medical aid upon the hospitals and clinics of the former, tubercular affections are unusually common; this part of Germany seems to be completely impregnated with the tubercular virus. In fact, I have never been in any medical centre in the hospitals and clinics of which tubercular affections are so overwhelmingly prominent in number as in Wuerzburg. As far as the histories (copied from the clinic record-book) of some of the above cases are concerned, it must also be said that, after the first cases came under observation, tuberculosis of the nasal mucous membrane in Wuerzburg lost the dignity of a great rarity, consequently no very extensive entries were made in the clinic journals, though every case was examined carefully by Dr. Seifert and his assistants; particles of diseased tissue removed were examined microscopically, and when they did not give unmistakable evidence of the tubercular character of the process, the iodide of potassium treatment was tried, to establish or exclude the diagnosis of syphilis.

In one particular case, in which a number of circumstances combined to suggest the diagnosis of tuberculosis, the anti-luetic treatment compelled to a change of diagnosis. As this was a very instructive case its history may here be given:

M. S., female, aged twenty-one years, servant, had been suffering from a very obstinate conjunctivitis on both eyes. She was treated at the University Eye-clinic, and when she developed some nasal trouble she was turned over to the clinic of Dr. Seifert, with the diagnosis: *tubercular conjunctivitis*. A rhinoscopic examination revealed granular masses on both lower turbinates looking very much like tubercular nasal granulomes. Influenced by the external appearance of the neoplasms, the diagnosis of tuberculosis of the nasal mucous membrane was made, and the growths were removed. A microscopic examination, and later clinical observations, caused some doubt as to the correctness of the diagnosis of tuberculosis; an anti-luetic treatment was instituted, and under it the case was rapidly cleared up as one of syphilis of the nose.

CASE X.—March 30, 1893, Cincinnati. C. G. B., aged thirty-three years, male, clerk; married for ten years; has no children; father died forty-three years old, of consumption; mother died of congestion of the bowels. About two years ago patient had a violent attack of coughing, with hemorrhage from lungs. Thinks, however, that he has not lost in weight during the last two years. No night-sweats, but coughs a good deal, especially in morning; denies infection, and no objective signs of it; uses alcohol and tobacco in moderate form. Has been hoarse for two months. Lungs: On left side below and above scapula behind, and below and above clavicle in front, dullness on percussion; bronchial breathing. Mucous membrane of pharynx injected and granular. Larynx mucous membrane injected; enlarged vessels; swollen; infiltration of false vocal cord on left side; true vocal cord on left side, margin ulcerated.

31st. Sputum examined; tubercle bacilli found in large number.

April 6 to 18. Patient has been ordered to take his temperature three times a day; it ranges between 99° and 101°. Temperature during the twelve days hardly ever normal.

3d. Patient, who had been ordered to take creasote, tr. gent. āā beginning with gtt. v and increasing by one drop every day up to gtt. xxx, stated that he had had since yesterday several copious hemorrhages from the nose. Examination revealed an oval, shallow, bleeding ulceration on the right side of septum near the floor, beginning almost directly behind the tip of the nose and extending backward, about 1 cm. long and 5 mm. wide. Near the posterior pole of the oval ulceration the anterior end of a crista is covered with small grayish tubercles and granules. They bleed easily on being touched with the nasal sound. The surface of the ulceration and the tubercles on the anterior end of the crista are treated energetically with the galvano-cautery burner; euophen is then insufflated, and the nasal cavity tamponed. During the next eight days the ulcerations bleed freely several times. They were not cauterized again, but sprayed freely with a solution of peroxide of hydrogen, and euophen then insufflated. This always acted as an astringent, and evidently also antiseptically, for gradually, as the patient (who can stand large doses of creasote remarkably well) under the general treatment improved in general health, the ulceration healed up.

May 15. The patient has gained six pounds in weight. The ulcers of the left vocal cord have improved under a 20 per cent. menthol (in ol. olivæ) and iodolum insufflation treatment, though not yet healed up. But the ulceration in the nose has completely healed up; its site is always covered with some crusts; on their removal the mucous membrane appears somewhat paler than that of the surrounding parts, but otherwise almost normal.

Undoubtedly the nasal ulceration and the granular nodules observed in this case were of a tubercular nature; they were characteristic in appearance, and occurred in a patient in the advanced stages of tubercular and laryngeal phthisis. The good result as to the treatment of these lesions in the nose (even if it be only a temporary one) I am inclined to attribute to the combination of the external surgical interference combined with the internal use of creasote, which evidently has acted very well, the patient having gained six pounds in weight under its use in about six weeks.

These, then, are the ten cases now first reported. I will now proceed to give a list of all cases published, and try to obtain from it a general clinical picture of the affection under discussion.

If we look over our collection of cases—eighty in number—we will find that tuberculosis of the nasal mucous membrane presents itself (a classification first proposed by Seifert) in three different forms: as an ulceration, as a tumor, and as a combination of both—either an ulceration, the margins of which present granular masses, or as a tumor which has been eaten away more or less by a process of ulceration. In our table we find seven cases in which no details are given as to the form of the tubercular lesion; the remaining seventy-three may be classified as follows:

Thirty-six cases in which the ulceration was predominant.

Twenty-nine cases in which the lesion had the character of a tumor.

Eight cases in which the lesion had a mixed character.

STATISTICAL TABLE OF EIGHTY CASES OF TUBERCULOSIS OF THE NASAL MUCOUS MEMBRANE REPORTED IN MEDICAL LITERATURE.

No.	Reported by whom, and where	Sex.	Age.	Form of lesion, location, etc.	Primary or secondary, and remarks.
1	Morgagni: De sedibus et causis morborum.	...	...	Tubercular ulcerations of pharynx, velum palati and nasal mucous membrane.	
2	Willigk: Prager Vierteljahrsschrift, xxxviii. p. 4.	...	...	Tuberculosis of septum.	
3	Clarke: Trans. Path. Soc. Lond., 1876, vol. xxvii p. 248.	M.	18	Mucous membrane of nose ulcerated and thickened.	Secondary to tuberculosis of tongue, palate, gums; lungs free. Patient died of inanition.
4	Laveran: Union Médicale 1877, Nos. 35 and 36.	M.	25	Ulceration on septum.	Tuberculosis of lungs. Patient died of pyo-pneumothorax
5	Laveran: Ibid.	M.	43	Ulceration on septum.	Tuberculosis of lung. Patient died of phthisis.
6	Riedel: Deutsche Zeitschrift für Chirurgie, Band x. p. 57.	M.	63	Ulceration and perforation of cartilaginous septum; tumor in same $2\frac{1}{2}$ cm. long; ulceration on left ala.	Primary; no evidence of pulmonary tuberculosis; reappearance of tumor and ulceration growths after surgical treatment.
7	Riedel: Ibid.	F.	55	Ulceration and perforation on cartilaginous septum, also tumor $1\frac{1}{2}$ cm. long.	Primary; no evidence of tuberculosis of lungs.
8	Spillmann: Berniër's Thèse de Spillmann, p. 190.	F.	33	Ulceration on left side of septum.	Phthisis, hæmoptysis, ulceration on annus.
9	Thornwald: Deutsche Archiv für klin. Mediz. Bd. xxvii. p. 586.	M.	26	Tumor on anterior end of left lower turbinate size of pea; on the floor of nasal cavity of same side tumors of same size; ulceration on septum.	Tuberculosis of pharynx, larynx and lungs
10	Wichselbaum: Allgem. Wiener med. Zeitung.	M.	15	Small nodules and tumors of size of hempseed on septum and floor of nasal cavities.	No further details given.
11	Wichselbaum: Ibid.	F.	62	Small tumors on right lower turbinate and on left middle turbinate.	No further details given.
12	Riehl: Wiener mediz. Woch., 1881, No. 45.	M.	36	Ulcer on left ala and on left side of septum.	Tuberculosis of lungs; died of phthisis.
13	Millard: Bull. Soc. Méd. des Hôp., 1881.	...	...	Tubercular nodules in nasal cavities.	Tuberculosis of pharynx. Post-mortem report no further details given.
14	Demme: Berl. klin. Woch., 1883, p. 218.	M.	1	Ulcer and small nodules on septum.	Tuberculosis of lungs; child died (1½ y'rs old) of phthisis.
15	Demme: Ibid.	M.	8 mos.	Nodules and ulcer in nasal cavities.	Primary when first seen. The child died soon after it came under observation of an acute attack of tubercular meningitis. Post-mortem showed lungs and bronchial glands free from tuberculosis.
16	Berthold: Berl. klin. Woch., 1884, p. 644.	...	...	Tuberculosis of nasal mucous membrane.	No further details given.
17	Sokolowski: Beitr. Chirurgie v. Bruns, Band iii. fasc. 3, p. 438.	F.	20	Ulcer on septum and floor of nasal cavity; tumor on anterior margin of ulceration.	Tuberculosis of lungs and larynx; death in consequence of these.
18	Schaefer: Deutsche med. Woch., 1887, No. 16.	F.	51	Granular tumor of septum cartilagineum	Primary; removal of tumor, reappearance later; perforation of septum.
19	Schaefer: Ibid.	F.	26	Granular tumor of septum cartilagineum.	Primary; removal, reappearance.
20	Schaefer: Ibid.	F.	39	Granular tumor of septum cartilagineum.	Primary; removal, reappearance, ulceration, perforation.
21	Schaefer: Ibid.	M.	32	Granular tumor of septum cartilagineum.	Primary; several times reappearance after removal.
22	Schaefer: Ibid.	M.	57	Granular tumor of septum cartilagineum.	Primary; tumor appeared after a kick (by a horse) in nose; after removal, no reappearance after nine months.
23	Schaefer: Ibid.	M.	51	Granular tumor of septum cartilagineum.	Primary; removal, reappearance
24	Cartaz: De la Tubercul. Nasale, Paris, 1887.	M.	42	Ulcer on septum cartilagineum.	Tuberculosis of lungs; died of phthisis.

No.	Reported by whom, and where.	Sex.	Age.	Form of lesion, location, etc.	Primary or secondary, and remarks.
25	Bruns: Reported by Zuneshaburo Kikuzi in Bruns' Beitr. z. Chir., Bd. iii. fasc. 3, p. 433.	M.	30	Tumor of septum ulcerated on its surface.	Primary; no tuberculosis in other organs; removal, reappearance after five months.
26	Michelson: Zeitschr. f. klin. Mediz., 1890, Bd. xvii.	F.	27	Tumor of septum cartilagineum.	Primary; no tuberculosis in other organs. Patient a demented, neglected girl. Removal, reappearance, later ulcerations.
27	Michelson: Ibid.	F.	21	Ulceration of septum cartilagineum.	Tuberculosis of larynx and lungs; died of phthisis.
28	Michelson: Ibid.	F.	48	Tumor of septum cartilagineum.	Primary; no tuberculosis of other organs.
29	Michelson: Ibid.	F.	19	Tumor on left lower turbinate.	Tuberculosis of larynx and lungs.
30	Michelson: Ibid.	M.	18	Ulcer on septum cartilagineum and ala.	Tuberculosis of upper lip, of submental and submaxillary glands; lungs free.
31	Juffinger: Wien. klin. Woch., 1889, ii. 253.	F.	21	Tumor of septum.	Lupus of cheek and neck; removal, reappearance.
32	Hajeck: Inter klin. Rundschau, 1889, iii. 613.	M.	30	Ulcer on septum.	Tumor in naso-pharynx; tuberculosis of lungs; removal; ulcerations.
33	Hajeck: Ibid.	M.	13	Ulcer; destruction of septum osseum.	Tuberculosis of glands.
34	Hajeck: Ibid.	F.	24	Ulcer on septum cartilagineum et osseum.	Patient otherwise healthy.
35	Mertens: Dissertatio Inauguralis. Wuerzburg, 1889.	F.	53	Ulceration on right lower turbinate and on left side of septum cartilagineum.	Primary; no tuberculosis of other organs; cauterization of ulcers; frequent new ulcerations appear on site of old ones.
36	Beermann: Dissertatio Inauguralis. Wuerzburg, 1890.	F.	34	Small tuberculous tumors on right side of septum cartilagineum.	Primary; no tuberculosis of other organs; removal, reappearance after 3 months.
37	Hahn: Deut. medizin. Woch., 1890, N. 13, p. 497.	F.	22	Several small tumors on septum cartilagineum and right lower turbinate.	Primary; no tuberculosis of other organs; removal; after six months tumor had not reappeared.
38	Hahn: Ibid.	M.	40	Tumor size of walnut which had perforated septum and protruded into other side.	Lupus of hand and face had been existing for many years.
39	Hahn: Ibid.	F.	55	Tumor size of hazelnut; perforated septum cartilagineum.	Primary; no tuberculosis of other organs; removal; tumor had not reappeared after three months.
40	Hahn: Ibid.	F.	17	Two small tumors on septum cartilagineum.	Chronic eczema of face; no tuberculosis of other organs.
41	Hahn: Ibid.	F.	19	Ulcer with granular masses on right side of septum cartilagineum.	Blepharitis ulcerosa; keratitis superficialis; scrofulus habitus; eczema of upper lip.
42	Hahn: Ibid.	F.	17	Ulcer with granular masses on septum.	Left apex dulness on percussion.
43	Knapp: Arch. f. Ophth., 1890, vol. xix.	M.	19	Ulcer in nose several years before; a tubercular conjunctivitis came under observation.	No tuberculosis of other organs mentioned.
44	Fitzpatrick: Cin. Lancet-Clinic, 1891, p. 468.	M.	25	Tubercular ulcer on mucous membrane.	Tuberculosis of pharynx and lungs; died of phthisis.
45	Fick, Correspond.-blatt. f. Schweiz. Aerzte, 1891, p. 211.	F.	26	Tuberculosis of left side of septum.	Tuberculosis of nasal duct both apices suspicious.
46	Haab: Ibid.	M.	...	Tuberculosis of nasal mucous membrane.	Tuberculosis of conjunctiva.
47	Gottstein: Die Krankheiten de Kehlkopfes, 1890, p. 272.	...	...	Tubercular deposit on septum narium, and perforation.	Tuberculosis of lungs, otitis media phthisica.
48	Grunwald: Die Lehre von den Nasen Eiterungen. Munich, 1892, p. 48.	...	...	Tuberculosis of nasal mucous membrane left lower turbinate.	Empyema of the antrum of Highmore.
49	Grunwald: Ibid.	...	...	Tuberculosis of nasal mucous membrane, right lower turbinate ulcerated.	Empyema of the antrum of Highmore.
50	McBride: Diseases of the Throat, etc. Philadelphia, 1892.	...	...	Tubercular nasal ulceration of lower and anterior part of septum; margins thickened.	No further details given.

No.	Reported by whom, and where.	Sex.	Age.	Form of lesion, location, etc.	Primary or secondary, and remarks.
51	Jurasz : Die Krankheiten der obern Luftwege. Heidelberg, 1891, p. 2. (The first of Jurasz's three cases has also been previously reported by Boylan, Cincinnati Lancet-Clinic, 1888, vol. xiv. p. 1.)	F.	19	Flat tumor on right side septum cartilagineum. uneven and ulcerated on surface.	Tuberculosis of skin of left thumb and right cheek was the primary tubercular affection; lungs at time when patient was seen first normal. One year later patient died of galloping phthisis.
52	Jurasz : Ibid.	M.	36	Irregular, ragged-edged ulcer on left side of septum.	Tuberculosis of lungs, caries of ribs, tuberculosis of buccal mucous membrane
53	Jurasz : Ibid.	M.	44	Ulcer in a thickened mucous membrane on right side of septum.	Phthisis pulmonalis et laryngis, also tubercular ulcer on tongue.
54	Olympites : Thèse de Paris, 1890.	M.	36	Ulcer on septum cartilagineum covered with small granulations.	Pulmonary and laryngeal tuberculosis.
55	Luc : Arch. de Laryngol 1889, Tome iii. p. 19.	M.	...	Granular tumor of the right lower turbinate ulcerated on its surface, later ulceration on left middle turbinate.	Tuberculosis of pharynx; tubercular orchitis; lungs very slightly suspicious.
56	Moure : Thèse de Paris de Boutard, 1889.	..	...	Tubercular ulceration in nose.	Tuberculosis of lungs, larynx, and pharynx.
57	Moure : Ibid.	M.	29	Ulcer on right side of septum cartilagineum, with granular surface.	Tuberculosis of lungs and larynx.
58	Ruault : Ibid.	M.	35	Oval ulcer on right side of septum cartilagineum near entrance to nose.	In last stages of tuberculosis of lungs.
59	Ruault : Ibid.	F.	40	Tumor springing from right side of septum cartilagineum.	Tubercular infiltration of larynx; fifteen months later tubercular infiltration of left apex. After removal of tumor septum soon became perforated. Death three months after pulmonary infiltration was first noticed.
60	Ruault : Ibid.	E.	23	Tumor on left side of septum cartilagineum	Primary; examination of lungs negative. This case was under observation two years; tumor removed four times; came back three times Five months after last removal no reappearance. Patient's condition of general health very good
61	Capart : Bull. de l'Acad. Roy. de Med. de Belg., 1890, Tome vi. p. 785.	F.	25	Easily bleeding soft tumor on the right side of septum cartilagineum.	Lungs free. The tumor was first, in 1884, believed to be a sarcoma. It was, therefore, extirpated very carefully, and did not reappear. Later the author corrected his diagnosis to tuberculosis of nasal mucous membrane.
62	Capart : Ibid.	F.	53	Easily bleeding soft tumor on the right side of septum cartilagineum.	Probably of secondary nature. Patient died soon of miliary tuberculosis
63	Capart : Ibid.	M.	35	Large tumor on septum cartilagineum.	No details as to primary or secondary nature given. Author states, after citing Cases 62 and 63, that he has seen in all 12 cases of tuberculosis of nasal mucous membrane; patients aged between 21 and 55 years; 7 males and 5 females.
64	Grossard : Annales de la Polyclinique Paris-Bordeaux.	M.	...	Tubercular ulcer on septum cartilagineum.	Tubercular bronchitis; patient was also syphilitic.
65	Vincenzo Cozzolino: Gaz. Medic. di Roma, Anno 1889, xv. p. 145.	F.	young girl	Tubercular ulcer on septum cartilagineum, with perforation.	Tuberculosis of lungs; died of phthisis
66	Cozzolino : Ibid.	M.	...	Tubercular ulcer on septum cartilagineum, with perforation.	No further details.
67	Baber : Brit. Med. Journ. 1889, No. 22, vol. vi. p. 1407.	F.	18	Perforation of septum cartilagineum.	Strumous disease of upper air-passages, tubercular eruption on outside of nose.

No.	Reported by whom, and where.	Sex.	Age.	Form of lesion, location, etc.	Primary or secondary, and remarks.
68	Tenneson: <i>Anales de Dermatologie et Syph</i> , 1889, vol. iii. p. 214.	...	...	Tubercular ulceration in nasal cavities.	Consolidation of right apex.
69	Onodi: <i>Pest. med.-Chir. Presse</i> , 1891, No. 46.	...	...	Tuberculosis of nasal mucous membrane.	
70	Browne: <i>Sajous' Annual</i> 1888, vol. iii. p. 261.	F.	20	Tuberculosis of nasal mucous membrane.	Tuberculosis of pharynx and larynx.
71	Own Case, No. I. (This case was once before reported by Mertens: <i>Dissert. Inaug. Wuerzburg</i> , 1889. It came again under observation later on, and was therefore left out of the table above.)	F.	24	Nasal tuberculosis first complained of in 1886; granular masses on left lower turbinate; later large granular tumor.	Eye trouble (dacryocysto-bleorrhœa since 1878) suppurating cervical glands.
72	Case II.....	F.	26	Ulceration on floor of nose, right side, and on left lower turbinate.	Lupus of face and also formerly lupus of mucous membrane of nose; lupus of inner canthus of right eye.
73	Case III.....	M.	12	Ulceration on right lower turbinate floor and septum cartilagineum; later perforation.	Enlargement of cervical glands; lungs free. After long treatment finally good result. General health good.
74	Case IV.....	F.	26	Ulceration of septum cartilagineum, covered with thick granulations, also tumor.	Strumous habitus; vestiges of glandular suppuration.
75	Case V.....	F.	13	Ulcerations on floor and on left turbinate bone.	Lupus of ductus naso-lachrymalis on both sides; lungs free.
76	Case VI.....	M.	50	Granular tumor of size of hazelnut springing from right middle turbinate.	Dulness over right apex.
77	Case VII.....	M.	31	Ulceration on left side of septum cartilagineum, with granular masses.	Lungs normal.
78	Case VIII.....	F.	49	Ulcerations and granulations on right ala; later perforation of septum.	Dacryocysto-bleorrhœa for two years; tip of nose shows granulations.
79	Case IX.....	M.	21	On middle of lower turbinate a granular easily bleeding tumor.	Lungs and larynx normal; everything else normal.
80	Case X.....	M.	33	Tubercular ulcer right side of septum cartilagineum, with small tubercles.	Tuberculosis of lungs and larynx; hæmoptysis.

Of course, one must not suppose that this classification is an absolute one. Very frequently we find an ulceration with some small granular masses either on its margins or its surfaces; if the ulceration is so pronounced that compared with it the neoplastic formation is insignificant, we have classified such a case as one of the ulcerative variety. On the other hand, we rarely see a tumor which is absolutely intact and without any ulceration whatsoever. However, if we see a case in its earliest stages we may find a perfectly intact tumor. Such was the case in my own patient No. IX. This case was only discovered accidentally; there were no complaints on the part of the patient, who was, to all intents and purposes, a healthy young laborer, in whom, outside of this tumor, no pathological condition could be discovered. The tumor was removed, and a microscopic examination verified the diagnosis made previously from the clinical aspect of the case. If we study closely our cases tabulated, we are perhaps able to gain some points as to the question

why tuberculosis of the nasal mucous membrane presents itself in one case in the form of a tumor, and in another in the form of an ulceration. In all probability we find a tumor in cases where we have to deal with the immigration of a comparatively small number of tubercle bacilli only, while in those cases where a large number of bacilli assault the tissues from the start, we will find the ulceration. The toxic effects of a large number of bacilli, which, of course, produce larger quantities of ptomaines, is so powerful that the formation of a neoplasm of any size is impossible. I use the term neoplasm unhesitatingly for tubercular nasal tumors. The fact that they may disintegrate later on in their existence is certainly not opposed to our views, because neoplasms of other kind take the same course. It is almost impossible to understand how a laryngologist of merit and distinction can deny the existence of tubercular tumors in the nose, and maintain that if such tumors are found they are originally not of a tubercular nature, but are only secondarily so infected. Bresgen,²⁴ who claims this, stands, as far as I can see, alone in his views, which are the less justifiable, first from the fact that in tubercular tumors we do not find the bacilli on or near the surface (Hajeck, *loc. cit.*); secondly, from the fact that we have in other situations and organs of the body tubercular processes leading to the formation of large and granular masses. We find in the larynx, as everybody knows, frequently extensive infiltrations, which only later on disintegrate and ulcerate. I have myself on one occasion seen such a powerful, rapidly growing neoplastic formation in one of the false vocal cords of a young woman aged about thirty years, that one of the greatest authorities in laryngology made the diagnosis "sarcoma of the larynx," which diagnosis, later on, had to be corrected to "tuberculosis," bacilli and giant cells having been found in an extirpated piece of the tumor.

Our view that the number of bacilli will influence the form of the tubercular lesion in the nose, is borne out by the fact that where we have to deal with a tuberculosis of the nasal mucous membrane secondary to phthisis—that is, under conditions when the individual permanently produces and expectorates enormous numbers of bacilli, and is exposed to them, where, consequently, when it comes to an invasion into the nose, most probably large numbers of bacilli locate there from the start—there we find almost universally, as seen from our table, the ulcerative form. On the other hand, where we have to deal with a primary tuberculosis of the nose, we almost exclusively find the lesion in the form of the tumor. This brings us to the question of *primary tuberculosis of the nasal mucous membrane*. That such a thing is possible has been denied; however, this denial is not borne out by the facts. Our table probably contains twenty cases of primary nasal tuberculosis.

Even if we admit that in some of these twenty cases doubts may arise as to their primary nature, we have cases enough left to prove that

such a thing as primary nasal tuberculosis does occur. The case given in our table under No. 3, while it is probably not a case of primary tuberculosis of the nasal mucous membrane, but one of primary tuberculosis of the pharynx or tongue, is a clear post-mortem report, showing that tuberculosis of the upper air-passages without phthisis does occur. If we read the histories of some of Schaeffer's (*loc. cit.*) cases (Table, Nos. 19-24) we shall find that it would be almost impossible to make of them anything else but primary cases.

An especially interesting and instructive case is Demme's second case (Table, No. 15). The little patient, a boy eight months old, from healthy stock, was given out when six months old to board with a family, the head of which was the subject of an advanced pulmonary tuberculosis. After being in charge of this man for two months, the child was brought to Demme for treatment, suffering from a nasal affection presenting the general features of an ozæna. There was no trace of a history of tuberculosis or syphilis in the parents of the child. A close rhinoscopic examination revealed grayish tubercles and ulcerations in the nose of the infant. The secretion taken from these lesions contained tubercle bacilli. A few days after coming under observation the boy became the subject of a very violent meningitis, rapidly leading to a fatal issue. The post-mortem revealed a tubercular basilar meningitis; while the lungs, bronchial glands, and abdominal organs, were absolutely free.

This case certainly must be looked upon as one in which the nasal tuberculosis was the primary affection. From the nose, the habitat of the tubercle bacilli, the latter found their way into the meninges, a convenient road over which not so unfrequently, even after insignificant operations in the nose, another micro-organism, the diplococcus of Fraenkel, travels to produce another meningeal affection, cerebro-spinal meningitis. Another case, which can hardly be construed as anything else but a primary one, is one of Ruault's cases (Table, No. 60). The patient, a healthy young woman of twenty-three years, was under observation two years; she never showed any signs or symptoms of anything else but her nasal trouble, which finally, after a fourth removal of the tumor, did not reappear. The patient's general condition while under observation was always good.

One of Michelsohn's cases (Table, No. 26), that of a demented, very much neglected girl of twenty-seven years, who was under observation for a long time, is also an undoubted primary case. We can well imagine how in it the infection was brought about. Demented individuals are very unclean; they do not pay any attention either to hygiene, cleanliness, or æsthetics. So this girl was probably in the habit of boring frequently with dirty fingers in her nose, and finally succeeded in importing bacilli into its mucous membrane. Probably, in the same manner, the nasal tuberculosis was brought about in one of Jurasz's cases (Table, No. 51).

The patient was suffering from a tubercular ulceration of the integument of the left thumb; this latter case, of course, is to be considered one of secondary nasal tuberculosis.

Some of our own cases might be enumerated here, but it is hardly necessary to dwell any more upon the subject; the possibility and occurrence of primary nasal tuberculosis cannot be doubted.

The *secondary* form of nasal tuberculosis is usually due to phthisis, be it that the bacilli which the phthisical patients expectorate are inhaled into the nose, or be it that they are carried to the nose through the blood and lymph channels. The latter seems to me very improbable.

In our table we find twenty-five cases in which tuberculosis of the lungs and larynx is mentioned as the primary affection. Ten times we find tuberculosis of the pharynx, palate, and tongue mentioned in connection with nasal tuberculosis; the latter form is usually secondary to the former. The *seat* of the tuberculosis of the nose is of interest. Often we find that more than one of the structures of the nasal cavities are involved. Fifty-three times we find the septum mentioned as the seat of the lesion; almost universally it is the septum cartilagineum which is involved; this part is either expressly mentioned, or the seat of the lesion, with reference to the entrance of the nose, is so described that one can easily see that the seat must be in the cartilaginous part of the septum. Only twice we find the septum osseum the site of the tubercular lesion: two of Hajeck's cases (Table, Nos. 33 and 34). Not infrequently the tubercular lesion situated on the septum leads to perforation, but as the osseous part is so rarely involved, saddle-noses in consequence of nasal tuberculosis almost never occur. Other parts of the nasal mucous membrane affected are: the lower turbinate (eleven times), the middle turbinate (three times), the inner side of the alæ (four times), the floor of the nose (five times). No details as to the seat of the lesion are given in ten cases. From the above figures we see that the septum cartilagineum is by far the most favored site of tubercular lesions of the nasal mucous membrane; it evidently constitutes in the nose a *locus minoris resistentiæ* for Koch's bacillus. As to sex, nasal tuberculosis in contradistinction to laryngeal tuberculosis does not seem to have any preference. Our table shows—

	Cases.
Males	35
Females	34
Sex not stated	11
Total	<hr/> 80

If we divide our material according to age we get the following figures:

	Cases.
1 year or under	1
1 year to 10 years	1
11 years to 20 years	16
21 " 30 "	19
31 " 40 "	13
41 " 50 "	6
51 " 60 "	7
61 " 70 "	2
Age not given	15
Total	<hr/> 80

The youngest patient, as shown by our tables, was eight months, the oldest sixty-three years old. The majority of all eighty cases occur between the ages of eleven and forty (forty-eight times). Nasal tuberculosis under one year and beyond sixty years, is very rare.

Tubercular tumors of the nasal mucous membrane are very variable in size; we find them from a millet-seed size to a large walnut size. The largest tumor in size is put upon record by Hahn (Table, No. 38); it occurred in a laborer, forty years old, who first came to the clinic in 1886. The patient presented a lupus of the hand, stating that he had had this affection since his twelfth year, a lupus of the tip of the nose since his seventeenth year, a chronic nasal catarrh since his nineteenth year. In the left inferior meatus there was seen an easily bleeding granular tumor of the size of a large walnut. The tumor had perforated the septum, and protruded into the right nasal cavity. After its removal the microscopic examination of sections of the growth revealed the characteristic structure of nasal tuberculomes, including the presence of tubercle bacilli. This case is not only of interest because it presents the largest tumor on record, but also because it shows the close relation between tuberculosis of the nasal mucous membrane and lupus of the external integument, a subject to be mentioned more fully below.

Tubercular nasal tumors are of roundish or elliptical general outlines; their surface is rarely perfectly smooth; as a rule it is uneven; granular, covered with tubercles; presenting, on the whole, somewhat of a strawberry appearance as to outline, but not as to color, because a grayish or grayish-yellow tint is predominant over the red or pink of the healthy normal nasal mucous membrane. The consistence of these granulation tumors is rather soft; they bleed very easily on being touched with the sound.

Sometimes we find instead of one well-defined tumor a number of small tubercular nodules. These generally disintegrate very soon, and when they are seen, not unfrequently after a short time the picture presented is that of an ulceration, nothing having been left of the neoplastic formation. The ulcerations found in nasal tuberculosis are generally

shallow, but sometimes also deeper ulcerations are seen; they are roundish, elliptical, or perfectly irregular in outline, surrounded by elevated soft margins, showing miliary tubercles. These ulcerations always bleed more or less; sometimes they may give rise to quite profuse hemorrhage. In our own case (No. X.) this occurred; the bleeding was quite free, a larger bloodvessel probably having been laid open by the ulcerative process. Sometimes large granular masses, more or less soft, and easily bleeding on being touched by the sound, spring from one or more points of the circumference of the margins of the ulcer.

The *microscopical examination* of tumors and granular masses removed from the margins of an ulceration, show a granular tissue traversed by connective-tissue bands. The cellular elements very much predominate, and consist of lymphoid and epithelioid cells. Frequently we see an aggregation of the cellular elements in masses, which present themselves in section in circular or oval outlines. Sometimes these cellular aggregations show nothing but a dense mass of cells, but sometimes the character of the genuine tubercle becomes evident, and giant cells, show themselves. Tubercle bacilli, if found, are few and far between. One often has to examine several sections of one and the same specimen before being able to detect tubercle bacilli. According to Hajeck (*loc. cit.*), they are easier found and in greater number in the deepest layers of the tumors. Bloodvessels are not so numerous in tubercular neoplasms of the nose, as, for instance, in sarcomatous growths. But they are more numerous than in syphilitic neoplasms. Around a bloodvessel, in a nasal tuberculome, we often find an aggregation of the cellular elements; sometimes cells have proliferated through the vessel wall into the lumen of the vessel; but we never see, as in syphilis, an extensive cellular proliferation comprising the whole circumference, and thickening enormously the middle coat of the vessel.

The *symptoms* of our disease vary a good deal according to the form under which it presents itself. Not infrequently, in the earlier stages, we do not find any symptoms at all. The patients have perhaps had a little running from the nose, sometimes a few drops of blood mixed with the discharge, but have not been inconvenienced to any extent, and have not paid any special attention to their trouble. Sometimes we have to deal with a tumor which has not yet attained a large size, and has absolutely not given rise to any symptoms whatever (our case No. IX.).

At other times, however, the tumor has become of such a size that the patient comes with the statement that his nose is stopped up. If we have to deal with the ulcerative variety the complaints will be profuse discharge, mixed with blood of a general muco-purulent character, yellowish or greenish in color, and often fetid. The formation of crusts is generally complained of by patients the subject of tuberculosis of the nose. Pain is rarely a symptom, and externally the nose seldom presents any

anomalies, lest it be that we either have a complication with lupus or tuberculosis of the external nasal integument, or that we meet with one of these very rare cases, when the tubercular process has destroyed the septum osseum, and consequently has given rise to a "saddle-nose." If after taking notice of the subjective symptoms a case presents, we next proceed to an objective examination, we will get a different picture, according to the variety we have to deal with, but, as a rule, in each case we find the attacked side of the nose filled with greenish-yellowish crusts; not infrequently a certain amount of fetor emanates from the nasal cavities. After the crusts are removed we will be able to see whether we have to deal with a case of tumor of the nose, ulceration, or one of a mixed character. In making a *differential diagnosis* of tuberculosis of the nasal mucous membrane, all the points as to clinical features, appearance of the lesion, etc., brought out above, have to be considered. It is sometimes not at all easy to make a correct diagnosis of each case when first seen. But the combination with tuberculosis of other organs, which is the rule (primary and uncomplicated cases being greatly in the minority), will greatly help toward a correct diagnosis. A microscopic examination will generally make a diagnosis absolutely certain. With carcinomatous growth, tubercular neoplasms of the nose could hardly ever be confounded; sarcomatous tumors of the small-celled variety may possibly mislead, but they are richer in bloodvessels than tuberculomes, and, of course, do not show any giant cells or bacilli. Clinically, a case of a sarcomatous tumor of the nose will likewise soon distinguish itself from tuberculosis. These tumors grow rapidly, are very soft, smooth on their surface, vividly red to purple, even to almost black, in color. After partial extirpation, sarcomatous tumors do not, like tuberculomes, re-form comparatively slowly, but, on the contrary, with surprising rapidity. Carcinoma in the nose may be mistaken for tuberculosis, and *vice versa*, but the former disintegrates more rapidly, and the disintegration involves deeply the structures on which the cancer grows; the margins of the ulceration are not like those in tuberculosis, soft, but on the contrary, very hard. Besides, carcinoma leads soon to that characteristic hard infiltration of the neighboring lymphatic glands, while tuberculosis eventually leads to, or is secondary to, suppuration of the cervical lymphatic glands. Malignant cachexia also shows itself early in carcinoma, while tuberculosis of the nose, if not combined with tuberculosis of some vital internal organs, may last for years without very seriously involving the patient's general health. The most important differential diagnosis is that from syphilis of the nose, a very frequent affection which often can only be differentiated from tuberculosis with difficulty. Some of the best writers on tuberculosis of the nasal mucous membrane have made it a very important point of differential diagnosis that tuberculosis attacks the septum cartilagineum, while syphilis attacks the septum osseum, and avoids the former.

This point is brought out on the strength of a statement coming from a celebrated rhinologist, Voltolini,²⁵ who maintains that syphilis assaults the septum osseum eagerly, but shows as decided a dislike for the cartilaginous part of the septum. I cannot verify this statement of Voltolini by my own observations; they, on the contrary, indicate a quite different state of affairs. Others have also had experiences quite different from those of Voltolini, for instance Jurasz,²⁶ who reports fifty-five cases of syphilis of the nose in which forty-five times the septum was the seat of the luetic lesion. In thirty-one out of these forty-five cases a perforation developed in the course of the affection; thirty times this perforation was found in the septum cartilagineum, and only once in the septum osseum. I think that such statistics, coming from a perfectly reliable source, show that the seat of the lesion or perforation cannot be utilized as a point of differential diagnosis between syphilis and tuberculosis of the nose. We should always, whenever we suspect a case of nasal tuberculosis, try to exclude syphilis. Usually, this will not be difficult, because we generally will find other undoubted syphilitic lesions, or vestiges of such. In very small children suspected cases are almost always due to congenital lues, because nasal tuberculosis, as we have seen, under one year is of the utmost rarity, there being in all literature only one case on record, while early nasal syphilitic manifestations are by no means rare.

Michelson²⁷ believes that a valuable point of differential diagnosis is to be found in the observation that tubercular ulcers of the nose are of a roundish or irregular form, while luetic ulcerations extend in the form of a longitudinal furrow far backward. A microscopical examination may, in case we find giant cells or tubercle bacilli, make a diagnosis absolute, but the absence of them does not necessarily mean syphilis. Some other microscopical differences between tubercular and syphilitic tumors have been alluded to above. After all, we will meet cases where the diagnosis between tuberculosis and lues must be left in suspense—until we have come to a final conclusion, through the free administration of the iodides, which will definitely decide the case, *ex juvantibus et nocentibus*.

In some cases we shall not be able to distinguish tuberculosis of the nasal mucous membrane from lupus of the same structure. In the light of our present knowledge upon the etiology of tuberculosis and lupus, we cannot be astonished that such may be the case. We know now, beyond a doubt, that tuberculosis and lupus are due to the same etiological factor, and we must expect transitory forms, which will be called by one name by one observer and by another by some other writer. A good deal has been written upon a microscopic differential diagnosis between lupus and tuberculosis. I do not intend to go into any details upon this subject, as I believe a differential diagnosis between lupus or tuberculosis of the nasal mucous membrane can only be made by the

clinical aspect of the case, and not by a microscopical examination; this view seems to me the more correct, as among our eighty cases tabulated we find some in which, beyond doubt, a lupus of the face has spread to the nasal mucous membrane by continuity, and has there taken on the clinical characters and the form of a typical case of tuberculosis. A case of this kind is reported, for instance, by Hahn (*loc. cit.*, Table, No. 38). The patient, when seventeen years old, was the subject of a lupus of the tip of the nose, which yielded to treatment after four years; two years later he began to suffer from a chronic nasal catarrh, and later on he developed a tuberculosis in the form of an enormous nasal tumor. Now, if it be true, as some dermatologists, for instance Neisser,²⁸ Bloch,²⁹ and others claim, that lupus of the face, as a rule, if not always, is caused by a previous lupus of a mucous membrane, we may have had in Hahn's case first a lupus of the mucous membrane of the nose, later a lupus of the external integument of the nose, which in its turn finally gave rise to a nasal tuberculosis. If such changes are possible, and everything points to the fact that they do occur, it is hard to conceive how exact microscopical border-lines could be drawn. Our own case No. II., presents a combination of lupus faciei and tuberculosis nasi, somewhat like that of Hahn.

The *course* of tuberculosis of the nose, as a rule, is very protracted, provided it does not occur during the last stages of pulmonary tuberculosis, when the phthisis, of course, leads to rapid fatal termination. Cases, however, not complicated with phthisis, may last for many years. In Riedel's case (Table, No. 6) the patient stated that he had been suffering from ulcerations of the nose for twenty-seven years. Some of our own cases (Nos. I., II., III., IV., etc.) were of a very protracted course, and had been under observation and treatment for years. However, even primary tuberculosis may lead to a very quick fatal termination, as shown by Demme's case (Table, No. 15), of a boy eight months old, who died inside of a few days from a tubercular meningitis, consequent and doubtless dependent upon the nasal tuberculosis. As a rule, however, the *prognosis*, as far as life is concerned, is good; tuberculosis of the nasal mucous membrane is in itself not dangerous to life. Possibly it may also eventually lead to a miliary tuberculosis; a case reported by Capart (Table, No. 62) indicates such a possibility. As far as a complete and permanent *restitutio ad integrem* is concerned the prognosis is decidedly bad, because most cases lead again and again to relapses.

The *treatment*, if it shall have any chance to bring about a permanent recovery, must be a radical one. Superficial cauterization, or the insufflation of antiseptic powders, is of no avail. The new growths must be removed as thoroughly as possible; then a permanent result may be looked for with some degree of probability. We see, for instance, that one of Capart's cases was permanently cured. The tumor in this instance

was believed to be of a sarcomatous nature, consequently a very radical and extensive operation was made, and the result was good. In our case No. III., the frequent occurrence of relapses was only checked by opening up the nose, dividing it during chloroform narcosis from the outside, and scraping it out with the sharp spoon.

Ulcerating surfaces ought to be either scraped or cauterized energetically with chromic acid, trichloroacetic acid, etc., or the galvano cautery; and to the wounds, during and after treatment, antiseptics, such as iodoform, iodol, aristol, or europen, should be frequently applied. I think it would be an excellent plan to give, during such a course of external treatment, creasote in large doses internally, as I succeeded even in an advanced case of phthisis in bringing about a perfect healing of tubercular ulcerations in the nose. How long this good local result in this case (No. X.) will last I am, of course, unable to state.

The *complications* which we meet in nasal tuberculosis are, as already in part stated above, pulmonary and laryngeal phthisis (mentioned twenty-five times in our table); tuberculosis of the pharynx, palate, and tongue (ten times); lupus of the face and nose, tuberculosis of the skin, chronic eczema of the face (twelve times); tubercular meningitis and miliary tuberculosis (each once); empyema of the antrum of Highmore (twice); suppurating and enlarged tuberculous cervical glands. A very important complication to which I want to refer, with some details upon which no writer on the subject of tuberculosis of the nasal mucous membrane has as yet laid stress, is, that with obstinate cases of dacryocysto-blennorrhœa, with tuberculosis and lupus of the excretory duct of the lachrymal apparatus and the conjunctiva, in a combination of nasal with conjunctival tuberculosis, the former may be the primary or the secondary factor. A very interesting case, investigated very fully, is that reported by Knapp (Table, No. 43), a tuberculosis of the conjunctiva of the left eye, in a male nineteen years old. The tubercular nature of the lesion was proven microscopically and by animal experiments. Knapp found in his patient cicatrices of former ulcers in the nose, which had been treated surgically. He believes that these former ulcerations were of a tubercular nature, and says: "In our case it is possible that the infectious material was transmitted from the meatus of the nose through the lachrymal canal into the conjunctival sac. This way of propagation is probable by the development of tubercular ulcers around both puncta lachrymalia." Fick (Table, No. 45) reported a case of tuberculosis of the nasal duct of the left eye, and, on examination, it was found that the nasal septum on its left side presented tubercular ulcerations. Haab (*loc. cit.*, Table, No. 46), in the discussion which followed the report of Fick's case, stated to the Zurich Medical Society that he had presented to it two years previously a case of tuberculosis of the conjunctiva complicated with nasal tuberculosis. (I am unable to find a detailed report of this case.)

In both of the two last cases, as well as in Knapp's case, the nasal tuberculosis was looked upon as the primary affection. In one of Hahn's cases (Table, No. 41) blepharitis ulcerosa is mentioned as one of the complications of this class of nasal tuberculosis. There is hardly any doubt that this ulcerative blepharitis was one of tubercular nature, as the patient is described as being of a general scrofulous habitus. It is not stated whether the nasal or the conjunctival lesion was looked upon as the primary trouble. In our own cases we find a dacryocysto-blennorrhœa in No. I., on the left eye, which had preceded the nasal tuberculosis of the same side for eight years.

A lupus of the inner canthus of the right eye, lupus of both naso-lachrymal ducts, and tubercular lesions in both nasal cavities are found in case No. II.; tuberculosis of the naso-lachrymal ducts of both sides, and nasal tuberculosis, are found in case No. V.; a dacryocysto-blennorrhœa of an obstinate nature, and of two years' standing, is found in case No. VIII.

There can be no doubt, of course, as to the intimate connection of nasal tuberculosis with conjunctival tuberculosis or tubercular disease of the naso-lachrymal duct. Whether the supervention of an obstinate dacryocysto-blennorrhœa in cases of nasal tuberculosis is only a coincidence, a predisposing factor, or whether these suppurative processes were caused by a tubercular invasion, and stand to the nasal tuberculosis in a direct relation, is a question which must be left open at present. It is certainly of great practical as well as scientific import to find a respectable number of our tabulated cases of nasal tuberculosis complicated with tuberculosis of the naso-lachrymal duct or the conjunctiva.

If we now try to formulate the results of our investigation upon the subject of tuberculosis of the nasal mucous membrane, we come to the following conclusions :

1. Tuberculosis of the nasal mucous membrane, compared with tuberculosis of other parts of the respiratory tract, preferably with this affection of the lungs and larynx, is a rare disease ; it is, however, not as rare as formerly supposed.

2. It is generally a secondary affection, but also occurs primarily, as proven by unmistakable clinical evidence and by post-mortem facts.

3. Where it occurs it is frequently secondary to pulmonary and laryngeal phthisis.

4. It occurs in the form of ulcerations, tumors, and a combination of both. The tumor is generally found in primary cases, while the ulceration is the prominent factor in advanced cases of phthisis.

5. It may occur at any age (except, probably, in the very earliest months of life), preferably at the ages between ten and forty years.

6. It does not show any predilection as to sex.

7. Its seat is preferably the septum cartilagineum.

8. Its course is very chronic, and relapses even after surgical interference are the rule.

9. It is, *per se*, not dangerous to life, but may eventually lead to fatal complications, such as basilar meningitis, and possibly miliary tuberculosis.

10. One of its most important direct complications by continuity, is that with tuberculosis of the naso-lachrymal duct and the conjunctiva.

11. It may also be complicated with tuberculosis of the pharynx, palate, tongue, external integument; lupus of the nose, face; tuberculosis of the cervical glands, empyema of the antrum of Highmore, etc.

12. Lupus of the face, or of the nasal mucous membrane, may in its further development lead to tuberculosis of the nasal mucous membrane.

Before closing this paper, it is my agreeable duty to most heartily thank my honored teacher and former chief, Privat-docent Dr. Otto Seifert, at Wuerzburg, to whom I am indebted not only for the permission to make use of, and to publish entries from the record-books of his polyclinic, but who also granted me the privilege of taking across the Atlantic his microscopical specimens of some of the above new cases. This has enabled me to give a full description of the microscopic pathological anatomy of nasal tubercular tumors.

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PELIOSIS RHEUMATICA IN A BLEEDER.

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THROUGH the kindness of Dr. Okie, of Berwyn, I present the report of this interesting case of peliosis rheumatica. Dr. Okie has given me the following notes made of the case prior to consultation with me:

"I first saw Robert L., aged eight and a half years, January 5, 1893. Found slight congestion at base of both lungs. Carbonate of ammonium, counter-irritation, and cotton packing were prescribed.

"He was much better next day. I then noticed discoloration at top of right ear. As the weather was intensely cold, I supposed it had been frost-bitten. January 7th, ear much worse, discolored and enlarged, with many spots appearing on face, neck, and thighs. Pain in knees and ankles. Was then told for the first time that the boy had complained of pain in knees several days before he was taken sick. Put patient on salicylic acid and soda, $2\frac{1}{2}$ grains each, every two hours, and wrapped the joints in cotton; also gave tincture of chloride of iron, 20 drops, with acetate of potassium, 2 grains, every four hours. Temperature $102\frac{2}{3}^{\circ}$; pulse 120."

Condition, January 8th, when first seen by me: Pain in joints improved but joints still tender and motion painful. Temperature 102° ;



pulse 120 and feeble. Purpuric spots present on both ears, cheeks, neck, shoulders, back, legs, and ankles, and some spots over trunk; also spots seen on gums, roof of mouth, and throat, which was sore. Swallowing painful and nourishment taken with difficulty. Ears, lips, eyelids, and chin greatly swollen and tender; conjunctivæ ecchymotic and œdematous; some vesicles formed on right ear and cheek, but no tendency to exu-

dative erythema or urticaria. Slight bronchial cough, but no pulmonary congestion.

January 11. Slight increase of pain in joints, which quickly yielded on return to salicylic acid. The pain preceded the appearance of a few fresh purpuric spots. Temperature 100°; pulse 108. On account of weakness he was given, by suppository, quinine, digitalis, and small doses of opium.

13th. Swelling of ear, chin, and eyelids diminished, and general condition much improved. The accompanying photograph was taken on the eighth day of the disease.

17th. Swelling of joints and tumefaction of face had entirely subsided. Temperature normal; pulse 100 and feeble. Liquid nourishment taken freely. No diarrhœa or mucous hemorrhages. Anæmia marked. Examination of blood showed 3,000,000 corpuscles to the cubic millimetre, in proportion of 1 white to 500 red; hæmoglobin 60 per cent.; numerous microcytes $1\frac{1}{2}$ to 3 micro-millimetres in diameter. Under continuance of iron, general tonics, and a nutritious diet, the patient rapidly improved, and February 1st, notwithstanding marked anæmia, was able to walk about the house.

The subject of this interesting clinical picture is the sixth of a family of seven boys. They, as well as the father, suffer more or less from rheumatism in joints and muscles, but have no articular deformity. No tendency to hemorrhage has shown itself except in this little patient and an older brother, aged fifteen years. These have had frequent attacks of epistaxis from infancy and severe hemorrhages after trivial injuries. In 1888 I opened a large axillary abscess for Robert, which bled for some time. A profuse bleeding, lasting several days, followed the extraction of a tooth. An operation, which I performed on the father in 1890, for necrosis of sternum, was not attended by unusual hemorrhage. Neither father nor grandfather of the patient was a bleeder. The grandfather, however, came from a very remarkable bleeder family, which I reported in *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, January, 1883. Of his three brothers, Mordecai died of hemorrhage of the stomach at forty; George, from same cause, at twenty; and Davis, from hemorrhage following venesection, at twelve.

Professor Osler, in his *Practice of Medicine*, p. 318, states that "Schönlein's peliosis is thought by most writers to be of rheumatic origin; and certainly many of the cases have the characteristics of ordinary rheumatic fever, plus purpura. By many, however, it is regarded as a special affection of which the arthritis is a manifestation analogous to that which occurs in hæmophilia."

This case certainly supports the latter view—as does the fact that the disease sometimes appears in several members of the same family.

REVIEWS.

HANDBOOK OF THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE THROAT, NOSE, AND NASO-PHARYNX. By CARL SEILER, M.D., Instructor in Laryngology and Lecturer on Diseases of the Upper Air-passages in the University of Pennsylvania; Chief of the Throat Dispensary at the University Hospital; Physician-in Chief of the Union Dispensary, etc. Fourth edition, thoroughly revised and greatly enlarged. Illustrated with two lithographic plates, containing ten figures, and one hundred and seven wood engravings. In one 12mo. volume, pp. xii., 396. Philadelphia: Lea Brothers & Co., 1893.

WE must congratulate the author and the publishers upon the success which this little work has attained in reaching its fourth edition since 1879. The volume is very convenient in size and profusely illustrated with more than fifty pages of woodcuts, which lend additional clearness to the text. Although this edition is advertised as enlarged and revised, we regret that the enlargement is on minor points, to the exclusion of many important divisions of the subject, and that many grave errors have been overlooked in the revision. Thus we note that less than a dozen lines are given to the consideration of the ear, with which diseases of the upper respiratory tract are so indissolubly connected; and diseases of the accessory sinuses are barely mentioned, while thirty pages are devoted to an elaborate disquisition on the formation of the voice.

In the opening chapter there is an interesting synopsis of the history of laryngology, and of the phases through which the laryngoscope has passed before arriving at its present perfection. Chapter II., "The Art of Laryngoscopy," gives the beginner excellent practical rules for making all the necessary examinations of the throat and nose, and points the way by which many faulty methods and positions may be avoided. The "mechanical diagram" in Chapter III. will serve a very useful purpose in explaining the complicated action of the intrinsic muscles of the larynx, so difficult for the average student to grasp. In this chapter and elsewhere mention is made of the "cartilages of Seiler," as if they were true sesamoid cartilages found in the vocal cords; Luschka, however, describes the fibro-cartilaginous points of the *processes vocales* of the arytenoid cartilages as occupying their position. Chapter IV. deals with the physiology of the larynx and nose, and we are glad to see that the important part performed by the nose in the respiratory function is recognized and brought up to our present knowledge. Chapter V., on instrumentation, closes this division, and the following pages are taken up with the special subject-matter of the book.

Although most of the diseases are treated with equal detail, we find a mere hint of follicular or lacunar tonsillitis, and no mention whatever of the lingual tonsil and of the important rôle it plays in reflex neuroses

of the throat, while the author has given us his views on influenza in an encyclopædic treatise. In a work of this size the minute structure of normal and pathological tissues cannot be dwelt upon in detail, and the author wisely refers students to larger works on the subject for such information. But we should like to have seen the pharyngeal tonsil spoken of as *lymphoid* in structure and not glandular, as it is here erroneously stated to be. Then, too, in the removal of hypertrophies of this growth, we think the curette should have been mentioned, as this is the instrument most commonly used.

It will confuse the student not a little to find clergymen's sore-throat placed under the head of chronic laryngitis, when it has so long been recognized as the synonym of follicular pharyngitis. On pages 205 and 209 we find in the treatment of that rare condition, adhesion of the vocal cords—here, however, mentioned as of frequent occurrence—the advice to cut the cords apart and prevent reunion by *requiring the patient to talk or read aloud during the healing process!* And though here, if anywhere, we might reasonably expect some reference to intubation, this important subject, as well as tracheotomy, is dismissed with a few words.

We deplore the frequent advice of the use of cocaine, especially in hay fever, and feel that most authorities are with us in condemning the use of the nasal douche and the practice of “sniffing” solutions up the nose, both so dangerous to the ear, but here so often recommended.

The tables of symptoms of diseases of the throat in the final pages of the book are excellent, and, being almost identical with those furnished by Lefferts to his students many years ago, we feel sure are thoroughly reliable.

W. J. F.

RESEARCHES IN FEMALE PELVIC ANATOMY.

TUBO-PERITONEAL ECTOPIC GESTATION. By J. CLARENCE WEBSTER, B.A., M.D., M.R.C.P. Ed., Assistant to the Professor of Midwifery and Diseases of Women in the University of Edinburgh. Edinburgh and London: Young J. Pentland, 1892.

IN these atlases, with descriptive text, Dr. Webster has embodied the results of sections and dissections upon women dying in pregnancy or in the puerperal state. The larger of the two works (*Pelvic Anatomy*, pp. 124) is based upon cases in the first, second, third, fourth, sixth, and fifteenth days of the puerperal period. Then follow the results of dissections of the pelvic floor, the book concluding with studies of a case of pregnancy (fifth month) complicated by ovarian cyst.

We do not recall a more valuable and interesting study of the puerperal period and its phenomena than that afforded by the first portion of this work. The sections were made most successfully, and the colored plates are clear and interesting. Their study emphasizes in the mind of the reader the relation between the lower uterine segment and the upper, and also the cervix. It is interesting to note how soon the lower segment vanishes and how anæmic the uterine muscle becomes after labor. In contrast with this is the engorged cervix and abundant sinuses in the peri-uterine tissues, affording ready access and develop-

ment to septic germs introduced at or shortly after labor. The study of these plates affords a picture of the size and shape of the recently emptied uterus, which should be in the mind of the obstetrician when douching, curretting, or manually exploring the uterus after labor.

A most interesting point developed by Dr. Webster is the almost impacted situation of the recently emptied uterus in the pelvis. By retraction of the uterine muscle and pressure of the pelvic walls the womb is so compressed that hemorrhage is prevented and its sinuses tightly closed.

In studying the position of the pelvic viscera about the uterus it is shown that the ovaries do not assume definite position corresponding to the rotation of the pregnant uterus on its long axis. The author further finds, in the anatomical arrangement of the pelvic viscera after labor, no reason for fearing compression of the ovaries during Credé's expression of the placenta, and ascribes such cases to pain caused in neurotic patients by uterine pressure in many cases where pelvic inflammation has left the uterus and its surroundings in a pathological condition. He regards as the safest grasp for compressing the uterus the hands, radial edges together, thumbs in front of the vertebræ, fingers in median line in front.

An interesting account of the position of the bladder after labor is also given.

In discussing the pelvic floor, attention is drawn to the fallacy of depending on section alone for an accurate idea of its structure. Dissection is regarded as a valuable and tried method of study. The author differs from the conclusions of Hart in that he considers the entire mass at the bottom of the abdomen, including the uterus and surrounding viscera, as opponents to intra-abdominal pressure, and hence as comprising the pelvic floor. He further calls attention to the pelvic fascia as most important in giving strength and support to pelvic contents.

An interesting section on the pelvis in the beginning of the fifth month of pregnancy, illustrated by a colored plate of a frozen section, concludes the volume on Pelvic Anatomy.

In the second of these books Dr. Webster describes and beautifully illustrates sections and microscopic studies of the body of a primipara who died after the removal through abdominal incision of an ectopic foetus. The variety of gestation is styled "tubo-peritoneal," and at its occurrence the case was unique. Two sacs were present, one containing the foetus, the other the placenta. The ovum began to develop in the left tube, which prolapsed in front of the left broad ligament, growing both upward and downward. In the early months of pregnancy the sac wall burst and the foetus, with unruptured amnion, escaped into the peritoneal cavity. The amnion became attached to the peritoneum, whose thickened epithelium formed a secondary sac wall. Polyhydramnios was present. The placenta remained in the dilated tube, the umbilical cord and amnion connecting the two cavities. The intestine and omentum were matted together about the foetal sac. Clinically, the case was of interest because of the little pain which the patient suffered after rupture of the tube and escape of the ovum. Her general condition was poor, and gastric and intestinal disturbance was present. During the early months there were no signs to lead to a correct diag-

nosis. Before operation the variety of ectopic pregnancy present could not be told. Spurious labor occurred just before operation. The uterus was enlarged, the cervix open, and decidua was present. Death resulted from uræmic poisoning, induced by pressure of the emptied sac and retained placenta upon the bladder, urethra, and ureters. The fœtus died before operation.

E. P. D.

THE CARDINAL SYMPTOMS OF URINARY DISEASE, THEIR DIAGNOSTIC SIGNIFICANCE AND TREATMENT. By E. HURRY FENWICK, F.R.C.S. London: J. & A. Churchill, 1893.

THIS admirable series of lectures inaugurates a new departure, at least in genito-urinary surgery, from the fact that the classification is not based upon diseases, but upon symptoms and symptom-groups. This is extremely serviceable.

Most of the urinary diseases are grouped under four cardinal symptoms: hæmaturia, undue frequency of micturition, abnormal urination, and pain and reflex neuroses.

In the introduction to the book a glowing tribute has been paid to the value of the electric endoscope, and yet the author has very justly stated that this instrument is unsuited for the requirements of the general practitioner. Fenwick's work presents, in part at least, the results he has formulated from his patient urethroscopic studies. Combined with the text are the histories of many cases illustrating the teachings of the author and the good effects which can be expected from intelligent treatment. At the end of each section there is tabulated a diagnostic synopsis. Thus, after an admirable discussion of the causes, symptoms, and treatment of hæmaturia, comes a table headed "Rules for Ascertaining the Source of Hæmaturia." These are somewhat dogmatically stated, perhaps too much so for scientific accuracy. They are very clear, directly to the point, and above criticism, as representing a tabulation for clinical teaching.

As would be expected, most attention is devoted to undue frequency of micturition. The frequency of quantity and the frequency of irritability are severally tabulated. The treatment under this section is particularly full. In undue frequency from pyelitis systematic irrigation of the ureters is suggested.

Cystitis is very briefly considered, as is its treatment, while ulcers of the bladder receive particular attention.

The treatment of posterior urethritis is fully discussed. The author states, when on the subject of prostatic irritability, that when the prostate of a man who has masturbated freely, and in whom the testes are soft and small, is examined, the lobes adjoining the median line are soft and shrunk, so that instead of a median convexity the finger encounters a median concavity. This cupping, or saddling of the prostate he terms "onanitic prostate," though he does not hold that it points solely to the habit of masturbation. In considering the frequency of micturition in large prostates it is quite positively asserted that enlargement of the gland precedes the loss of power of the vesical muscle and the collection of residual urine, and many cases are cited where with distinct prostatic

hypertrophy there was little or no urine remaining in the bladder after micturition.

In discussing the treatment of enlarged prostate with considerable amount of residual urine, the dangers of catheterization are fully pointed out, and the statement is made that no amount of scrupulous care and forethought, no attention to detail, can prevent a mortality in these cases. A certain percentage will die. In this opinion most men of wide experience will concur. The operative treatment of these cases is fully considered.

Perhaps in the chapters on Pain and Reflex Neuroses, Fenwick is most original. He has gone far beyond Ultzmann in this direction, and presents an admirable study of what must have been a peculiarly rich clinical experience.

The book ends in a chapter upon what is termed Abnormal Urination. He summarizes his views on the subject in a tabular form under the headings Abnormal Urination, Impossible Urination, and Uncontrollable Urination.

As a general criticism it may be said that after a careful reading of this book one feels that it has been somewhat unnecessarily cumbered by case records; that there is a somewhat surprising faith as to the efficacy of drugs, and that in the zeal for classification facts have sometimes been treated with little ceremony. Nothing else unfavorable of the work may be said. It is original, it is most independent, it puts well-known facts in a new light, and it will add new laurels to the distinguished writer, whose reputation has no need of further heralding. E. M.

DU TRAITEMENT PAR L'ELECTROLYSE DES DÉVIATIONS ET ÉPERONS DE LA CLOISON DU NEZ. Par J. BERGONIÉ, Professeur à la Faculté de Médecine, Chef du Service Electro-thérapique à l'Hôpital Saint-André, et par E. J. MOURE, Chargé du Cours de Laryngologie, Otologie et Rhinologie à la Faculté de Médecine. O. Doin, Éditeur, 8 Place de l'Odéon. Paris, 1892.

TREATMENT OF DEVIATIONS AND SPURS OF THE NASAL SEPTUM BY ELECTROLYSIS.

THIS pamphlet, of about sixty pages, is distinctly a work for the rhinologist, and, though it does not present much that is original on the subject, he cannot fail to benefit by its perusal. The removal of septal spurs by electrolysis is an uncommon operation in this country, and anyone wishing to make a thorough study of this means of operating could not do better than give this article a careful reading, for the authors make a clear and comprehensive statement of the whole subject. It abounds in practical points, and sufficient cases are introduced fully to illustrate the different methods.

The first half of the book contains a *résumé* of the anatomy of the nose and of the irregularities of the septum, and a historical review of the usual methods of operating upon spurs and ridges. The remainder of the book is devoted to a thorough description of the various modes of applying electrolysis, and of the necessary instruments, and contains all that is essential to the perfect understanding of its use in these cases.

For the introduction of this valuable method in rhinoscopic operations we are indebted to Miot, who first proposed it in 1888. He uses both the monopolar and bipolar systems, but inclines toward the former in his practice. Bergonié and Moure, however, highly favor the bipolar method, and report results which would seem to substantiate their opinion. They assert that by the bipolar method, *i.e.*, inserting both negative and positive needles into the obstructing angle, one séance is sufficient (although the eschar may not separate for fifteen or twenty days), subsequent perforations are avoided, and but little pain is caused. On the other hand, by the monopolar method, *i.e.*, the positive pole applied to the spur or ridge and the negative attached to a plate on the opposite side of the septum, much pain is caused during the operation, lasting for several days afterward, the current cannot be so carefully estimated and controlled, and perforations are of commoner occurrence.

The illustrations are excellent, and, contrasting the work with so much that is written on rhinological subjects, this comes to us as a refreshing change, the subject being comparatively new and full of suggestions.

W. J. F.

CRÉASOTE ET TUBERCULOSE: REVUE GÉNÉRALE. Traitement de la Tuberculose pulmonaire par la Créasote administrée par Voie rectale. Par le DR. HENRI AUDEUD, Médecin diplômé de la Confédération Suisse; Assistant à la Clinique médicale de l'Université; Médecin interne à l'Hôpital Cantonal. Pp. viii. 269. Genève: J. Studer, 1893.

CREASOTE AND TUBERCULOSIS. By DR. HENRI AUDEUD.

THE numerous papers which have appeared in the current literature during the past fifteen years give evidence of the interest which the creasote question has aroused. Since their number is increasing each year, and their authors are not altogether in accord as regards methods or results, it is well for the practitioner to pause, review the literature and ascertain how far his work accords with the best that is done in the leading medical centres. The author commences modestly, claiming only that creasote and its derivatives should be included among the drugs which have given the least failures in the treatment of tuberculosis and which are almost universally employed. After giving the chemical and physical properties of the drug, he shows that in the first period of its use—1833 to 1877—the results were far from brilliant, from chemical impurity, insufficient dosage, and brief duration of treatment. After its reintroduction by Bouchard and Gimbert, the literature has become extensive, and the questions of method of administration, dosage, duration of treatment, and contra-indications have received due attention.

The author has shown an intimate acquaintance with the work of others, and gives an excellent *résumé*. He points out the true value of guaiacol as compared with that of creasote, and gives a brief consideration of the benzoate (benzosal) and carbonate of guaiacol, giving, however, the preference to good, rectified creasote. In reporting the biological experiments he shows that his view of tuberculosis is a broad one. The pathological physiology shows that creasote is mostly eliminated by the kidneys, and after a discussion of its mode of action, finally con-

cludes that it produces a substitutive irritation upon diseased tissues, and is a profound modifier of the respiratory system. All of the published statistics are reproduced in tables and are given very succinctly. In the second part we find a very strong argument for the administration of this remedy by the rectum. Every detail of duration of treatment, dose, formulas, precautions, are given with precision, and a table, showing careful painstaking observation of twenty cases, is given. In presenting his results he takes into consideration the general condition, body weight, fever, night-sweating, appetite, vomiting, diarrhoea, dyspnoea, cough, expectoration, bacilli, hæmoptysis, physical signs, nervous symptoms, urine, and menses. He believes that with care and observation of ordinary rules for rectal enemata, poisoning should not occur. A very excellent bibliography is appended. Although this work is ostensibly an argument for the administration of creasote by rectal enemata, it is really a monograph. The history has been so faithfully studied, the clinical work has been so carefully done, that it is a valuable addition to the literature of a drug which is likely to have a permanent place in the *materia medica*. The facts for the special method of administration are ably presented, but the whole subject is treated with so much breadth of scientific spirit that it merits our warmest commendation. R. W. W.

DISEASES OF THE RECTUM AND ANUS: THEIR PATHOLOGY, DIAGNOSIS AND TREATMENT. By CHARLES B. KELSEY, A.M., M.D., Professor of Diseases of the Rectum at the New York Post-Graduate Medical School and Hospital; late Professor of Diseases of the Rectum at the University of Vermont, etc. Fourth edition, revised and enlarged, with two chromolithographs and one hundred and sixty-two illustrations. Pp. 490. New York: Wm. Wood & Co., 1893.

THE present edition of this excellent work, thoroughly revised, may fairly be said to present the recognized practice of the day, while the author expresses his personal views with much force. Forty opening pages are devoted to points in anatomy and physiology, and here a somewhat lengthy discussion as to the presence or absence of a third sphincter leads to the conclusion that this is only a band of the circular muscular fibres of the rectum. Some very sensible advice as to careful actual examination of cases would, if followed, remove much of the obscurity which often surrounds rectal cases in the minds of the general profession. "The man who acquires a reputation as a diagnostician in this department is the one who simply uses his eyes and his fingers, and refuses to deceive himself by jumping at conclusions in the dark."

The work is enriched by many brief illustrations from the author's experience, increasing very greatly its practical value. A noteworthy and valuable feature is the attention to minute detail in descriptions of treatment. The worn-out but most important subject of hemorrhoids is handled in an eminently practical way. In treatment, reliance is placed upon cold water and regularity of the bowels for the non-operative cases; and upon the clamp and cautery for those of graver type. The ligature he has largely abandoned.

Not a small difficulty which confronts the practitioner in the larger cities is the competition of the irregulars, who, by their advertisements

and by their undoubted success in many cases, have built up a prejudice among the laity against the "knife, ligature, or caustic." It is something of a consolation that the author, so well situated for forming an opinion, is confident that "as a popular remedy, the use of the carbolic acid injections has seen its best days." He says that the reaction in the public mind has already begun. Full details of this method are given. In 1885 he reported about 200 cases with very satisfactory results at that time, and for a year or more he used injections almost exclusively; but the fact that he has since had "a succession of bad and troublesome cases," has led him to largely abandon the method. He now uses it only "in selected cases where radical operative measures are for any reason contra-indicated." The following statement is significant (p. 188): "All of the patients I had supposed cured by this method, and upon whose cases I based my former favorable report, are now returning to be again cured by some lasting method."

The Whitehead operation, of excising the pile-bearing area, is not indorsed.

In the treatment of stricture of the rectum electrolysis deservedly receives but scant recognition. He has made careful trials in his own practice, suspects the reality of the "perfect cures" reported, and considers that in this condition electrolysis reduced to fact means either simple dilatation or the application of the cautery.

While it may be said that the work is defective in devoting attention to some operative measures, such as intestinal anastomosis, which it cannot, within its limits, fully treat, there is much that deserves hearty commendation.

Written largely from the standpoint of treatment in a very readable way, this enlarged edition cannot fail to increase the popularity which has already been attained by former issues.

G. E. S.

LESSONS IN PHYSICAL DIAGNOSIS. By ALFRED L. LOOMIS, M.D., LL.D., Professor of the Practice of Medicine and Pathology in the University of the City of New York. Tenth edition, revised and enlarged. 8vo., pp. 278. New York: Wm. Wood & Co., 1893.

HAD Professor Loomis written a new work, instead of revising one which, in its day, was more than excellent, he would have done justice to his reputation and his subject. As it is, while the book remains useful, and within its limits reliable, it is not the best of which the author is to-day capable. Thus, for example, there is no reference to modern methods of examining the stomach and its secretions, or to the application of electricity in diagnosis; the section on the blood is hardly so full or explicit as modern knowledge requires; in the section on urinalysis no mention is made of cylindroids, of acetone, of diacetic acid, of the so-called diazo reaction. On the other hand, the original illustrations of actinomyces, tubercle, anthrax, and typhoid-fever bacilli, and the microphotograph of *filaria sanguinis hominis*, are worthy of special commendation. Beyond these points there is nothing to be said of a work that has lived, and deservedly so, to ten editions. Its merits of clear and terse statement, and its fidelity to clinical observation, have won and will retain its position as an acknowledged authority.

S. S. C.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE
MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

COCILLANA.

DR. H. H. RUSBY presents an elaborate paper upon the botany and pharmacology of this drug. It is a very valuable expectorant, possessing properties which are likely to make it one of the most important of the South American contributions to the resources of therapeutics. It belongs to the natural order *Meliaceæ*, of which the only representative in the United States is the *Melia azedarach*, or China-tree of the Southern States. The material used is the thicker bark from the trunks and large branches of the tree.

DR. VIRGIL COBLENTZ has studied its chemistry and pharmacy. He found that it contained—1. A white crystalline body (hexagonal plates) soluble in ether, chloroform, alcohol, acetic ether, and glacial acetic acid; insoluble in alkalis. This body belongs to the so-called “camphor-like” bodies, or more properly, solid hydrocarbons. 2. A greenish-yellow fixed oil of a pungent, acrid taste and an earthy odor; soluble in ether, chloroform, alcohol, and turpentine. 3. An indifferent resin, as a white impalpable powder. 4. An alkaloid, in microscopic crystals.

DR. ECCLES found a red and a white resin, and an alkaloid of a light straw color, which was insoluble in water. The hydrochloride is soluble in water and entirely so in acid solutions.—*Bulletin of Pharmacy*, 1893, No. 8, p. 350.

[The dose of the tincture is $\frac{1}{2}$ to 2 drachms; of the fluid extract, non-alcoholic, 5 to 25 m; of the syrup, 1 to 2 drachms.—R. W. W.]

SERUM-THERAPY.

DR. ALBERT HAMMERSCHLAG reports five cases in which he has made use of blood from patients who had recovered from typhus, as a remedy for this disease. By venesection (arm) he removes about five ounces of blood directly

into a sterilized glass cylinder, into which had been previously placed about a drachm of a sterilized 4 per cent. solution of sodium oxalate, which prevents the clotting of the blood. Direct transfusion, after preliminary cocaine injection, was practised, the arm being selected. At first the plasma was alone used; later, and after use of the oxalate solution assured the absence of sediment, the entire blood. He concludes that the transfusion of the blood of patients convalescent from typhus in patients suffering from that disease has no lasting effect; this conclusion, it is true, being based upon these few cases. Perhaps from the serum of animals which have, by means of the typhus bacilli, been rendered immune, a substance may be obtained which can be used as a remedy against typhoid fever. The late observations of Chantemesse and Vidal are that the use in typhus of the serum of animals rendered immune against typhus is without result.—*Deutsche medicinische Wochenschrift*, 1893, No. 30, S. 711.

THE ACTION OF SPERMIN AS A PHYSIOLOGICAL TONIC.

DR. ALEXANDER POEHL, in 1891, had concluded that this remedy, when used subcutaneously, was a physiological tonic in all kinds of debility, neurasthenia, anæmia, etc. He found also that it had a specific action, not only upon the prostate and testicles, but also upon the thyroid, thymus, and pancreatic glands, and in addition upon the spleen and ovaries, and under normal conditions it circulates as a physiological constituent of the blood. His experiments show that spermin possesses the property, through its catalytic action, of increasing the diminished oxidation capacity of the blood, and of favoring the so-called intra-organic oxidation. He bases this conclusion upon—1. The behavior of metallic magnesia in the presence of spermin. 2. The restoring of the oxidation capacity of blood when it has been removed by chloroform, nitrous oxide, strychnine, free acids, and pathological urinary constituents. 3. The experiments of Tarchanoff on animals after section of the spinal cord. 4. The clinical observations upon patients suffering from deficient oxidation, anæmia, neurasthenia, scurvy, diabetes, cachexias, and the great proportion of diseases in which symptoms of auto-intoxication appear, that is, in which the products of retrograde metamorphosis of albumin accumulate in the organism. 5. The results of urinary analysis. 6. Observations on the biological properties of the cholera bacillus, when it was noted that the reduction manifestations which accompany the development of the cholera culture were absent.

The explanation of failures in the relief of certain diseases seems to lie in the insolubility, that is, the inactivity of the remedy. Recognizing the fact that Charcot-Leyden crystals are also composed of spermin-phosphate, and that these are found in diseases where deficient oxygenation is a prominent characteristic, as in asthma, leukæmia, typhus, pneumonia, and phthisis, the identity of these crystals with those of spermin-phosphate has been determined, and also the transition of the amorphous to the crystalline form, demonstrated. In this amorphous, difficultly soluble spermin-phosphate he finds the explanation of the failure of spermin to act upon intra-organic oxidation. It was further demonstrated, by the neutralization by phosphoric acid of an alkaline solution of spermin, that this insoluble, amorphous

salt was formed. Since the phosphoric salts are present in the organism in notable quantity, the acidity of the medium plays an important part in the determination of an active, soluble preparation, or whether the inactive form may be made, by a diminution of the normal alkalinity of the tissues or of the blood. The observations of Kraus are quoted, in which the relationship of the alkalinity to the blood to a decomposition product of lecithin is shown, and also his observation that in typhus, scarlet, pneumonic, and rheumatic fever, and diabetes, the alkalinity of the blood is diminished. Nerve tissue is especially rich in lecithin compounds, and irritation of this tissue results in the diminished alkalinity of the blood circulating through it. And it is quite likely that here the soluble may be changed into the insoluble spermin-phosphate. This fact explains the reason of the diminished intra-organic oxidation (auto-intoxication) as the result of diseases of the nerves, and gives an explanation of the good effects found after subcutaneous injections in the treatment of these diseases—that is, the oxidation is brought to the normal and the tissues freed from leucomaines. In the uric acid diathesis which accompanies diseases of the nerves and in gastric catarrh we may also expect benefit. At the same time the action of the spermin may be assisted by remedies which increase the alkalinity of the blood, as Carlsbad, Cur, or alkaline waters, Vichy, Bilin, or Ems.—*Berliner klinische Wochenschrift*, 1893, No. 36, S. 873.

MYXŒDEMA TREATED BY THYROID FEEDING.

MR. JAMES ADAMS reports two cases. The first within six weeks lost the slowness of thought, speech, and movement, and was able to knit easily, though not able to do heavy work. The myxœdema and feeling of cold disappeared, and she became active and buoyant. Menstruation did not return, but there was a profuse growth of hair. In the second case the œdema of the eyelids disappeared within the first week, the backache was gone, and she could easily climb stairs within a month. The method adopted was to mince fresh thyroid and administer it in a sandwich of bread and butter flavored with pepper.

The eighth of an ordinary sheep's thyroid, thrice weekly, seems enough, at least, to begin with; for great difficulty was found in getting the patients to continue the treatment during the first fortnight owing to unpleasant symptoms, probably due to too large a dose, though perhaps partly owing to rapid elimination of accumulated waste products. It is evident that the treatment must be kept up, for an intermission is likely to be followed by a return of the symptoms.—*The Glasgow Medical Journal*, 1893, No. 3, p. 196.

THE INFLUENCE OF INJECTIONS OF SODIUM CHLORIDE UPON THE ABSORPTION OF FLUIDS.

DRS. G. GAERTNER and A. BECK have undertaken to solve the problem whether, after bringing an increased amount of salt into the blood by injection of sodium chloride into the veins, there will be a more rapid absorption of water that has been artificially placed in the cavities of the body. Experimentally it has been found that dogs which had received injections of large

quantities of sodium chloride bear them without injury to their health, but soon thereafter suffered from great thirst, and took large amounts of water; otherwise nothing abnormal was remarked. The experiments were divided into two classes: 1. The absorption from the intestine. 2. The absorption from the serous cavities. The experiments showed that the over-salting of the blood hastens the absorption of fluid from the intestine and from serous cavities in very considerable quantities; while in from fifteen to thirty minutes in a healthy animal only a relatively small amount of water would be absorbed from a ligatured loop of intestine, in a similar time after a preliminary salt injection the whole or almost the whole of the fluid injected would be absorbed. The investigations as to the pleural cavities and as to the joints gave similar results. The results of the experiments are important because these intra-venous injections are harmless and give promise of better results than other methods of producing absorption in conditions which imperil the functions of important organs—in acute hydrocephalus, large pericardial effusions, in profuse diarrhoeas which are seen in Asiatic cholera, in cholera nostras, and in certain intoxications. Theoretically this over-salting of the blood seems to be more rational than the usual intra-venous injection, for the latter only removes a temporary danger, while the intestines continue to remove the fluid from the blood. On the other hand, in cholera the objection may be urged that the absorption of the contents of the intestine would be a source of danger to the patient. It may be said that the very poisonous properties of this fluid have not been accurately determined, and besides at the height of the disease absorption from the intestine does not take place, and indeed this method does not prevent the irrigation of the intestine to be combined with it. Confirmatory of this theory is a single observation of Töpfer, who, in the last epidemic of cholera, sometimes made use of a concentrated sodium chloride injection in place of a physiological one, with the result that these cases showed favorable progress.—*Wiener klinische Wochenschrift*, 1893, No. 31, S. 563.

CHLORATE OF SODA IN THE TREATMENT OF CANCER OF THE STOMACH.

M. BRISSAUD has made use of the soda salt, which is more soluble than the potash and at the same time much less toxic. The daily dose has been from two to four drachms, without, however, exceeding the latter amount in the twenty-four hours. In several undeniable cases of cancer of the stomach the relief has been striking. In the five cases the patients are entirely cured, apparently, under this treatment, which has suppressed the melæna and the hæmatemesis; the appetite has returned, the cachexia has disappeared, and in three cases in which an appreciable epigastric tumor existed, this has disappeared in about six weeks. In forms that are epitheliomatous in their nature, this treatment seems to be successful; in others, the sarcomatous or of the interstitial variety, the treatment is unsuccessful. The same result is likely to follow in generalized cancer and in conditions in which treatment can have no influence. One case is cited where failure was observed; the liver was involved before treatment was begun. Of the latter, one death from phlebitis of the vena cava is an example. Since no notable elimination of this remedy has been observed after its administration, it is probably decomposed in the organism.—*La Mercredi Médical*, 1893, No. 35, p. 417.

THE TREATMENT OF DYSENTERY.

DR. S. SCHWARZ has used, with success, sometimes a powder at others pills composed of chemically pure extracts and alkaloids of the following combination: Myrobalani, extract of triticum repens, pelletierin, extract of pomegranate and gum arabic. The difficulty lay in procuring the myrobalani free from purgative properties. This, however, has been overcome. The method of treatment is a daily dosage of nine pills, taken at three times, the amount for children being from one-fourth to three-fourths the adult dose. The diet is chiefly of meat, rice, and sago; boiled water, red wine, with or without water, weak tea, and black coffee are permitted. Milk is, however, forbidden. This diet must be continued for six to eight days, and the pills can be continued in diminished dose. As a prophylactic, two pills each morning and evening are sufficient. In acute and recent cases of dysentery it is proper to commence the treatment with a morning dose of an ounce or more of castor oil, and afterward to go on with the treatment as given above.—*Internationale klinische Rundschau*, 1893, No. 36, S. 1346.

[Neither the formula nor the dose of the remedies is given by the author Myrobalani from the *Myrobalanus emblica* is not a new remedy, for the fruit was in repute with the Arabians as primarily laxative and secondarily astringent in doses of from two to eight drachms.—R. W. W.]

A NEW TREATMENT OF TUBERCULOUS PERITONITIS.

DR. W. NOLEN having noticed that merely the opening of the abdominal cavity with removal of the tuberculous exudation, even when antiseptics were not used, resulted in cure, attributed this result to changes in the condition of the circulation produced by the emptying of the cavity, and to the contact of the air in a chemical, physical, and bacteriological sense. The former cannot explain the result, because simple puncture with complete evacuation does not result in cure; therefore the latter appeared to be the probable explanation. Wegner having shown that the insufflation of air into the abdominal cavities of animals was harmless, he determined to make use of this method, taking the precaution to previously sterilize and warm the air. Three cases are reported in which combined aspiration and air sufflation resulted in success, in the sense that the ascites did not return. The advantage of this method over a cœliotomy are obvious: no chloroform narcosis, no incision worthy of the name, and impossibility of septic infection. The method of performance is as follows: A wash bottle of one quart capacity is two-thirds filled with distilled water, and provided with a rubber stopper, into which is inserted two bent glass tubes, one of which reaches nearly to the bottom of the bottle. This tube connects by means of a rubber tube with a glass cylinder filled with sterilized cotton, which in turn is connected to the short tube of a wash bottle, but of larger capacity. The long tube of this bottle is connected by rubber tubing with an irrigator containing a boric acid solution. The short tube of the wash bottle containing sterilized water is the one to be connected with the trocar, which is used for aspiration. The apparatus—trocar, wash bottle, glass cylinder, intervening tubing—must be sterilized before use. The trocar with its tubing in place

is inserted into the abdominal cavity midway between the umbilicus and the anterior superior spine of the ilium, and the ascitic fluid withdrawn into sterilized vessels, the distal end of the tubing being constantly kept under the surface of the fluid withdrawn. As soon as this is accomplished, the needle is withdrawn until its distal end can be placed against the parietal peritoneum; the end of the rubber tube, pinched together, is removed and connected with the short tube of the wash bottle, the plug of sterilized cotton, with which the tube had been stopped, having been previously removed. The reservoir containing the boric acid solution being now raised about twenty inches, its contents now flow into the empty wash bottle, the air therein contained, being filtered through the cotton contained in the cylinder, bubbles through the warmed, distilled, and sterilized water of the wash bottle and enters the abdominal cavity. As the air enters the cavity it is brought into intimate connection with the peritoneum and intestines by external pressure of the operator's hands. After five minutes the air is removed by aspiration, the reservoir being lowered to accomplish this. Some air can be left in the cavity without harm to the patient. There is no pain produced by the insufflation, and no accidents are recorded. One or two days after the operation the abdomen may show meteorism. The method has been followed in a single instance of tuberculous peritonitis by Mosetig-Moorhof.—*Berliner klinische Wochenschrift*, 1893, No. 34, S. 813.

REST IN CARDIAC AFFECTIONS.

DR. T. LAUDER BRUNTON believes that, as a remedial measure, rest frequently requires to be absolute; as a preventive one it may be only relative. The amount enjoined must be carefully proportioned to each case, as in advanced mitral disease, when the power of the heart is failing, absolute rest gives satisfactory results, in that the circulation recovers its balance, the arteries become filled and the veins emptied, the dropsical effusion and venous engorgement of the organs disappear, and the patients recover a fair amount of health. In cases of mitral disease incompetence may come about from (1) enlargement of the auriculo-ventricular orifice, (2) thickening of the valves or (3) incoördinated action of the muscoli papillares. In the first case it may be hard to say if this be the sole cause of the regurgitation, without any obvious disease of the valves, as some disturbance of the relationship between the muscoli papillares may tend to aid the regurgitation. In such hearts in growing boys and in chlorotic girls, comparative rest may be useful, and sometimes absolute rest may be almost essential. In some cases the former may be all that is wanted as a prophylactic measure. In chlorotic girls gentle exercise is advisable, but it must be carefully graduated, as exhaustion is likely to do harm. Massage may be useful, as it gives the patient exercise without putting any strain upon the heart. With a fatty heart gentle exercise may be advisable, as it may be more likely to bring about a healthy condition of the heart than absolute rest. When in mitral disease cardiac tonics, even pushed to their utmost limit, fail to give relief, then absolute rest becomes of great importance. Massage is of great usefulness in clearing out the body-waste, quickening the flow of blood through the muscles, and relieving the œdema, and the patient gets the advantage of the

exercise without overdoing his heart. It also allows the treatment to be carried out more easily than it would otherwise be, for it removes the feeling of weariness and irritability, fidgetiness and unrest of the patient.—*The Practitioner*, 1893, No. 303, p. 190.

THE following papers are worthy of notice :

“Chloralose, a New Hypnotic,” by DR. SCHUIRER, in the *Wiener medizinische Presse*, 1893, No. 34, S. 1342.

An excellent though brief *résumé* of the literature of a remedy which bids fair to be an excellent substitute for chloral.

“Typhoid Fever and its Successful Treatment,” by DR. J. HOBART EGBERT, in *Notes on New Remedies*, 1893, No. 4, p. 49.

A paper recommending the use of internal antiseptics and antipyretics, and containing many practical points.

“The Local Use of Essences in Surgery,” by DR. JUST LUCAS-CHAMPIONNIÈRE, in the *Journ. de Méd. et de Chir. prat.* 1893, 11e Cahier, p. 401.

This paper is especially devoted to the essence of cinnamon and cinamol in retinol as local antiseptics.

MEDICINE.

UNDER THE CHARGE OF

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SPONTANEOUS ANEURISM OF THE BRACHIAL ARTERY IN THE COURSE OF A VEGETATING ENDOCARDITIS.

At the Twenty-second Congress of the French Society for the Advancement of Science, recently held at Besançon, LEGENDRE and BEAUSSENAT (*La Médecine Moderne*, 1893, No. 63, p. 792) reported the case of a woman, twenty-five years old, who, five months after a second attack of acute articular rheumatism, attended with violent palpitation and followed by a protracted and difficult convalescence, was suddenly seized with a sense of painful tingling in the upper extremity, a small tumor shortly afterward appearing at one point upon the arm. The woman became quite cachectic, and suffered a good deal from general pains, though only the right arm was tender upon pressure. Upon the inner surface of the arm at its upper third was a tumor about as large as an egg pulsating synchronously with the heart-beat. A rough, high-

pitched systolic murmur could be heard in the course of the brachial artery. There was a slight retardation of the pulse upon the right side, and a thrill could be felt upon palpation of the tumor. In the præcordium a thrill could be felt with the apex-beat, while a diastolic rumbling could be heard with duplication of the second sound. The general condition improved somewhat, but the local condition became aggravated; œdema appeared in the lower extremities, and the tumor increased in size. The temperature suddenly rose; the tumor further increased in size; the overlying skin became tense and red, and hemorrhagic phlyctenulæ appeared in the neighborhood of the swelling. Exploratory puncture showed that the tumor contained blood. The skin covering the tumor grew progressively thinner and finally ruptured, giving exit to a large quantity of clotted and liquid blood, so that it became necessary to apply compression to the subclavian artery, several hours after ligature of which the patient died. Upon post-mortem examination the tumor was found to be a diffuse aneurism, the limitations of which were formed by the skin and the brachial aponeurosis in front and the triceps muscle behind. The aneurism communicated with the brachial artery. The vein was also ruptured and its walls thickened, although it did not communicate with the artery. The heart presented a condition of vegetating endocarditis upon the free margins of the mitral leaflets. Sections of the brachial artery at different points disclosed the existence of an infectious arteritis in various stages of evolution, together with the presence of streptococci, which were also found in an infarct in the spleen.

TWO CASES OF DIABETES MELLITUS AND CIRRHOSIS OF THE LIVER.

PALMA (*Berliner klinische Wochenschrift*, 1893, No. 34, p. 815) has reported two cases in which the uncommon association of diabetes mellitus and cirrhosis of the liver was observed. One case occurred in a man, thirty-seven years old, without hereditary predisposition, who denied venereal infection, but who had used alcohol immoderately. For eighteen weeks there had been progressive weakness, with preserved appetite and increased thirst. The surface of the body generally presented a dark-brownish discoloration. The visible mucous membranes were icteroid. The thyroid gland was not enlarged. Heart and lungs presented no abnormality. Liver and spleen were enlarged. The urine contained a large amount of sugar and traces of acetone and biliary coloring matter, but no diacetic acid. The second case occurred in a man, forty-three years old, whose illness had begun four months before coming under observation, with slight jaundice in the absence of gastrointestinal derangement. Soon there appeared abdominal pain with constipation followed by diarrhœa. At this time the abdomen began to swell and a sense of general weakness was observed. To these symptoms œdema of the lower extremities, with increased swelling of the abdomen and pain in the right hypochondrium, became added. Later the weakness became more profound, and shortness of breath set in. The surface of the body presented a blackish-brown pigmentation. The visible mucous membranes were icteric. The dependent portions of the body were œdematous. The liver was not enlarged and the spleen but slightly so. The urine contained varying quantities of sugar, acetone from time to time, and biliary coloring matter, but no

diacetic acid. Calomel was administered as a diuretic but proved inefficacious, paracentesis becoming necessary. The patient grew progressively worse, and finally died. Two days before the fatal issue sugar could not be found in the urine, and at the time of death neither acetone nor diacetic acid could be found, so that death must be ascribed to cholæmia. Upon post-mortem examination the liver was found to be small, firm, icteric, and granular; the kidneys and spleen enlarged and firm; the pancreas enlarged, but without morbid alteration. Expression is given to the opinion that the association of diabetes mellitus and cirrhosis in a given case can only be considered as a coincidence and of no further significance; and the justification for the designation of "bronze diabetes," sometimes employed, is denied.

THE ETIOLOGY OF CHRONIC RHEUMATIC ARTHRITIS.

SCHÜLLER (*Medical Record*, No. 1194, p. 389) makes an interesting contribution to the study of the so-called rheumatic inflammations of the joints. In observations upon 116 cases of the kind named he found that the swelling and other external appearances were dependent upon a characteristic chronic inflammation of the synovial membranes and of the synovial villous excrescences, leading to hyperplasia. Mild cases may by imperceptible gradations assume the characters of the grave ones, with enormous proliferation of villous excrescences in the joint resulting in great deformity and impairment of function. In the inflamed tissues of the synovial membrane and of the synovial villous excrescences, Schüller has found short, thick bacilli, the central portions of which are notched or grooved, while the poles present a collection of bright granules. The organisms were also found in the freshly excised portions of joints of living patients, as well as in the synovial fluid itself. Cultures in various media proved successful. Injection of considerable quantities of the cultures was followed in rabbits by swelling and inflammation. After the death of the animals the joints treated were found to contain no pus, but to present the evidences of synovial inflammation similar to that found in man. The peculiar bacilli were also found in the joints and responded to the culture tests. Inoculation of other rabbits with the new cultures was attended with results similar to those already obtained. Other experiments also demonstrated that the bacilli do not cause suppuration. Injections of large quantities of the cultures caused death. Œdema developed at the site of the injection, and the bacilli could be cultivated from the œdematous fluid and in some cases from the blood of the right heart. The opinion is expressed that the organisms isolated are responsible for the inflammatory conditions found, to which a predisposition may be established by a previous attack of acute rheumatism or other inflammatory affection. It was observed that in many of the cases under observation there also existed chronic catarrhal conditions of the genito-urinary, nasal, and respiratory mucous membranes, so that it is possible that these may be the channels of invasion. The organism stains most readily with carbol-fuchsin, but is readily decolorized by acids, sometimes unduly so. The protoplasm of the organism is condensed in two parts, which are of a roundish, oval, or cylindric shape and lie closely together, being separated by a narrow, clear area. The bacilli measure from 2.26 to 2.76 μ in length, and from 0.75 to 0.95 μ in width. They

are not always perfectly straight, sometimes being slightly curved or angular. They are to be distinguished from tubercle bacilli both by their form and their behavior to stains and by their mode of development in culture. The organisms grow at a temperature a little higher than ordinary temperature, about 25°, though better at a somewhat higher temperature, but they must be kept in the dark. Stab cultures in gelatin in the course of two, three, or six days present small knobs or grains along the course of the puncture, followed by turbidity, which progresses to opacity, liquefaction finally taking place. Liquefaction also takes place in gelatin plate cultures. Small, whitish-gray, or membraniform spots form in cultures in bouillon, peptone, agar-agar, cooked potatoes, and sliced carrots.

THE DIAGNOSTIC SIGNIFICANCE OF HERPES LABIALIS.

FELIX KLEMPERER (*Berliner klinische Wochenschrift*, 1893, No. 29, p. 694) has made an interesting clinical and bacteriological contribution to the subject of the significance of herpes labialis in the differentiation of tuberculous from epidemic cerebro-spinal meningitis. He reports at length three cases of cerebro-spinal meningitis, in which the possibility of a tuberculous origin had to be considered. Two presented a family history of tuberculosis. One was complicated by pleurisy, with effusion. All presented herpes labialis. One terminated fatally; the post-mortem examination showed the condition to be non-tuberculous. In the other two recovery took place. In one of these only pneumonia cocci were found in the fluid of the vesicles; while in the fatal case unencapsulated diplococci were found that in bouillon culture formed chains. The results are also reported of examinations of the contents of herpetic vesicles of the lip in nineteen other cases. In fourteen cases pneumoni cocci, staphylococci, and streptococci were variously found, but in every instance only one form. In five cases in which the contents of the vesicles had already become turbid, streptococci and staphylococci were found. The conclusion is reached that the micro-organisms found in the fluid of the vesicles must be considered as the cause of the eruption, and, further, that they are the same as those causative of the primary disease. It is pointed out that herpes occurs commonly in the course of diseases (such as pneumonia and angina) caused by micrococci, or (such as rheumatism and endocarditis) in which micrococci cause secondary infection, and with but extreme rarity in the course of diseases (such as typhoid, diphtheria, and tuberculosis) that are dependent upon specific micro-organisms. The deduction is thus reached that the appearance of herpes labialis, in the course of an attack of cerebro-spinal meningitis, may be considered as indicating a non-tuberculous origin.

THE IDENTITY OF THE STREPTOCOCCUS PYOGENES AND THE STREPTOCOCCUS ERYSIPELATIS.

KNORR (*Berliner klinische Wochenschrift*, 1893, No. 29, p. 699) has reported a case demonstrating the identity of the streptococcus pyogenes and the streptococcus erysipielatis. This identity has long been accepted by bacteriologists on morphologic grounds, but actual demonstration has hitherto been wanting. The case was that of a man, forty years old, in which, follow-

ing upon a slight injury of the great toe, a phlegmon developed in the region of the metacarpo-phalangeal articulation, suppuration of the joint subsequently ensuing, with intermittent fever, high temperature, and rigors. In spite of the evacuation of the joint the constitutional symptoms persisted. Several days afterward a large, painless, fluctuating tumor appeared upon the outer aspect of the right thigh, the skin covering which presented no indication of inflammatory change. On incision a large amount of pus was evacuated, bacteriologic examination of which revealed a pure culture of streptococci, which grew in bouillon into long chains and macroscopically gave rise to the formation of a scaly sediment, the supernatant fluid remaining clear. These micro-organisms proved actively pathogenic for mice. In the further progress of the case, other pyæmic abscesses developed upon both forearms, and suppuration took place in the left shoulder-joint. Evacuation of each of these accumulations failed to relieve the septic symptoms. Four weeks after the onset of the illness a severe rigor suddenly occurred, with elevation of temperature and the appearance of a typical erysipelatous eruption about a small bed sore over the sacrum. Two days later isolated erysipelatous eruptions appeared about the incisions that had been made, gradually extending for two days, when death took place. From a fragment of skin removed with most scrupulous antiseptic precautions from the periphery of the area of erysipelatous inflammation, a pure culture of streptococci was obtained, while tissue from an uninvolved portion yielded negative results. It was impossible to cultivate streptococci from the blood. The streptococci obtained from the primary abscess and those obtained from the area of erysipelatous inflammation were not only morphologically identical, but also behaved identically in cultures and in pathogenic virulence.

THE ETIOLOGY OF ACUTE ARTICULAR RHEUMATISM.

SAHLI (*Deutsche Archiv für klinische Medicin*, Bd. li., H. 4 u. 5, p. 451) contends that although the infectious nature of acute articular rheumatism has not yet been demonstrated, such an etiology is highly probable from the point of view of modern general pathology. In favor of such a causation are the acute febrile course, the local involvement of the joints, and the tendency to complication by endocarditis and inflammation of serous membranes. Sahli reports the case of a girl, sixteen years old, with a second attack of acute articular rheumatism, complicated by endocarditis, pericarditis, bilateral pleurisy, and, finally, left-sided pneumonia, death suddenly taking place with cyanosis, perspiration, and heart-failure. At the post-mortem examination vegetations were found not only upon the leaflets of the mitral valves but also upon the aortic semilunar segments and upon the lateral leaflet of the tricuspid valve; the pulmonary leaflets were free. Inoculations were made upon agar and gelatin from the endocarditic excrescences, from the enlarged bronchial glands, the synovial membrane and the contents of an affected knee-joint, the thickened pericardium, the inflamed pleura, and from blood from the heart. In almost all instances pure cultures of a single organism developed, which corresponded in all essential characters with the staphylococcus pyogenes citreus. Animal inoculations yielded negative results. The conclusion is expressed that the organism found is to be looked

upon as the cause of the disease. It remains to be determined whether this organism is a distinct one or a modified form of the staphylococcus pyogenes citreus. It seems possible (and the possibility is supported by evidence) that acute articular rheumatism may be caused by attenuated pyogenic cocci, and future investigation must determine whether a single or several species of organisms have an etiologic relation to the disease. The bacteriologic examination in the case reported indicates that the so-called complications of acute articular rheumatism (endocarditis, pericarditis, pleuritis) were etiologically related to the primary disease, of which they were thus not complications but merely localizations. In numerous other cases of acute rheumatism subsequently examined, staphylococci were also found in the contents of affected joints and in the blood.

THE LOCALIZATION OF PURE WORD-BLINDNESS.

DEJÉRINE and VIALET (*Compt.-rend. hebdom. des Séances de la Soc. de Biologie*, N. S. 9, t. v. No. 28, p. 790) have reported the case of an intelligent and cultured man, sixty-eight years old, who presented absolute verbal blindness both for letters and for words. There was loss of the comprehension of musical signs—musical blindness—while the ability to read figures and to calculate was preserved. There was no sign of verbal deafness, and no indication of difficulty in articulate speech. There was no mind-blindness and no visual aphasia. The power of mimicry was retained, as was also the ability to write spontaneously and upon dictation. Transcription was, however, imperfect and difficult. Motility was preserved, as was also general and special sensibility and the muscular sense. These symptoms had been present for four years. Death occurred suddenly, paraphasia and total agraphia having existed for two days without a sign of verbal deafness, and general intelligence and the power of mimicry remaining intact. Upon post-mortem examination an area of recent red softening was found in the inferior parietal convolution and angular gyrus of the left cerebral hemisphere; while areas of old, yellowish atrophic lesions were found in the lingual lobule, the fusiform lobule, the cuneus, and the apex of the occipital lobe, with secondary degeneration in the splenium of the corpus callosum, and pronounced atrophy in the optic radiations. The right hemisphere was perfectly intact. Upon histologic examination profound alterations were found in the posterior portion of the lingual and fusiform lobules, particularly in the collateral fissure. All of the white matter of these convolutions was destroyed and replaced by cicatricial tissue. The lingual lobe was apparently the less profoundly affected, though on microscopic examination its white fibres were found to be almost entirely disorganized; at the level of the lower lip of the calcarine fissure, however, a portion of the calcarine stratum had withstood the process of destruction. Advancing toward the cuneus the cortex progressively resumed its normal appearance. These characters indicated that the lesion was least pronounced at the level of the lower lip of the calcarine fissure, and was especially localized to the fusiform and lingual lobules. The lower portion of the ventricular cavity was likewise involved in the process of softening. The tapetum, the optic radiations of Gratiolet, and the inferior longitudinal fasciculus of Burdach were entirely destroyed. The

lesion became gradually less marked toward the outer wall of the ventricle. All of the structures in the descending branch of the calcarine fissure participated in the softening. From the anatomic findings in this case and from physiologic considerations the deduction is drawn that the lower portion of the inferior longitudinal fasciculus of Burdach contains physiologically differentiated fibres that connect the visual zone with the zone of language.

SURGERY.

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THE PRESENT POSITION OF THE SURGERY OF THE HYPERTROPHIED PROSTATE.

At the recent meeting of the American Surgical Association, WHITE (*Annals of Surgery*, 1893, vol. xviii., No. 2) presented an exhaustive study of the surgery of the hypertrophied prostate. The subject was considered under the following heads: 1. The nature and chief varieties of the prostatic enlargement and their relation to the vesical changes found associated with them. 2. The symptoms in relation to diagnosis and prognosis: (a) subjective; (b) objective. 3. The indications for (a) non-interference; (b) medical treatment; (c) palliative treatment; (d) operative treatment. 4. The choice of operation.

In considering the first of these headings, the theories of Guyon and Harrison were separately discussed and rejected as not offering satisfactory explanations of the condition; in fact, they seem to have been based on false premises. The analogy between the prostatic hypertrophy and uterine fibromyomata, pointed out by Velpeau, and later formulated by Sir Henry Thompson, is provisionally accepted as the best working theory thus far advanced. This conclusion intimately affects prognosis and treatment.

The prominent symptoms of prostatic hypertrophy, while not pathognomonic, are, when taken in connection with the history, fairly conclusive. They are: undue frequency of urination, particularly at night; difficulty in starting the stream; feebleness of the stream (a full stream, dropping almost vertically); interrupted micturition; incontinence of urine (retention with overflow), etc., the number and variety of the symptoms depending upon the nature and extent of the enlargement.

While digital examination by the rectum enables one to recognize a general enlargement of the gland, it does not afford any indication of the extent of encroachment upon the urethra. Obstruction of the urethra can most accurately be determined by the use of steel urethral bougies, or by silver or soft English catheters. If these instruments are arrested at a point more than seven inches from the meatus, the obstruction is in the prostatic urethra.

For purposes of treatment the character of the growth should be studied. A classification based on the following factors is suggested, not as being exhaustive, but as being useful in deciding upon the proper treatment. 1. The predominant character of the growth, whether *soft*, indicating excess of glandular and muscular elements, or *hard*, showing advanced fibroid change. 2. The seat of the growth. 3. The presence or absence of general sclerosis. 4. Infection of the vesical mucosa.

The consistence of the gland can most satisfactorily be determined by rectal palpation. The seat of the growth, whether affecting the middle or lateral lobes, will be best determined by the presence of residual urine in the former and its absence in the latter, and the difficulty experienced in passing an ordinary catheter in the former class of cases.

Expectant treatment is proper only in those cases in which the enlargement has produced no symptoms, in which catheterism is easy, and in which there is no residual urine. Medicinal treatment is useful principally in meeting the complications of prostatic hypertrophy. Palliative treatment consists in the use of steel sounds and the employment of the catheter. These measures are applicable to a large number of cases, and when systematically and carefully carried out frequently give great relief and enable the person to go for many years in comparative comfort. In more advanced cases, and in those in which palliative treatment fails to relieve the patient, surgical interference is to be advised, provided the condition of the patient is considered satisfactory. This should include the majority of severe cases, but advanced renal disease contra-indicates operation. The operative measures suggested are overstretching the prostatic urethra, perineal prostatotomy, perineal prostatectomy, and supra-pubic prostatectomy. The first three are applicable in a limited number of cases, the special indications being detailed, while in the majority of instances the latter is the operation of choice.

It occurred to the author that if the analogy between uterine fibromyomata and prostatic hypertrophy was a real one, castration might have the same effect upon the latter that oöphorectomy has upon the former. Following out this thought, a large number of dogs were castrated and killed at varying intervals thereafter, and in every instance the size of the prostate was much less than the average in animals of the same weight, while, microscopically, the gland showed distinct evidences of atrophy. These results are confirmed by the observations of Bilharz and Pelican—that the prostates of eunuchs are extremely small—and those of Gruber and Civial, each of whom had the opportunity of examining the prostatic glands of a man who had been previously castrated—the latter observation having been made during the course of the operation of lithotomy. The researches of Hunter, Owen, and Griffiths on animals also confirm those of the author. The question of the value or the applicability of castration in cases of hypertrophy

of the prostate was left open, the author contenting himself with the simple statement of the facts.

REDUCTION OF DISLOCATIONS OF THE SHOULDER-JOINT BY MANIPULATION.

THOMAS (*British Medical Journal*, 1893, No. 1697), reports thirty cases of dislocation of the shoulder treated by manipulation. Of these twenty-four were reduced without difficulty, at the first attempt, on the day of the accident; they were dislocations into the axilla. The time required was from fifteen seconds to six minutes.

The method employed is a modification of that of Professor Kocher, and is carried out as follows: With the patient lying on his back, the operator grasps the hand of the injured side, takes hold of the corresponding arm immediately above the elbow with the other hand, flexes the elbow to a right angle, and then gently and firmly rotates outward the arm as far as it will go (*first stage*).

Rotation outward is maintained, and the elbow is carried to the patient's side (*second stage*).

Then, if necessary, the elbow is carried forward close to the curve of the thorax (*third stage*).

One piece of strapping fixes the elbow to the side, and the hand is carried in a sling.

Several of the dislocations were reduced in the first stage of the manipulation, the majority in the second stage, and others resisted until the third stage.

A NEW METHOD OF REDUCING DISLOCATION OF CERVICAL VERTEBRÆ.

WALTON (*Journal of Nervous and Mental Diseases*, 1893, No. 9) refers to a case in which a dislocation of a cervical vertebra was successfully reduced by a method which he had previously pointed out, and which was based upon experiments upon the cadaver.

The commonest form of dislocation of the cervical vertebra, without fatal result, is that in which one articular process slips over the one below, producing a deformity corresponding with that observed in torticollis. The diagnostic feature of the former condition is the immobility of the head, without spasm of the muscles which produce this deformity.

The method of reduction is described as follows: Suppose the left articular process of one vertebra has slipped forward over the corresponding articular process of the vertebra below, and has fallen in the depression anterior to that process. This turns the face to the right and bends the head over toward the left, as in spasm of the left sterno-mastoid muscle. No amount of extension will remove the vertebra from its new position in the slightest degree, as has often been shown; nor will rotation be available until the depressed articular process is raised.

The proper method is simply, therefore, to first raise this process and then rotate. This can be accomplished only by extending the head obliquely backward toward the right, using the transverse process on the right as a fulcrum. The ligaments which have held the vertebra firmly in its faulty

position make no opposition to this movement, so that no force is required to first elevate in this way, and then to rotate to the proper position.

In bilateral dislocation it is quite probable that this manœuvre, carried out first on one side and then on the other, will meet with success. This is the movement, the author thinks, which has been made in those cases in which reduction has followed voluntary muscular action.

OBSTETRICS.

UNDER THE CHARGE OF

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FIVE CASES OF ABDOMINAL SECTION AFTER CONFINEMENT.

ARMSTRONG (*Montreal Medical Journal*, 1893, No. 1) reports four cases as follows:

Case I. A woman pregnant three or four times, previous labors normal. Soon after getting up on the tenth day she became feverish, complaining of abdominal pain and soreness. During the next four weeks patient had a very fluctuating temperature, an occasional chill, frequent sweats and abdominal pain. On opening the abdomen the omentum was found adherent to the uterus and tube of the left side; and on carefully detaching the adherent margin, a pus-sac was found, the walls of which were formed anteriorly by the omentum, below by the left tube and ovary, and above by knuckles of intestine. The pus was removed, the tube and ovary carefully tied off, as well as fully one-third of the omentum. The patient recovered.

Case II. A woman confined of her second child, was attended in labor by a midwife. On seventh day developed a severe rigor, with temperature 104° and quick pulse. Examination disclosed a tender abdomen with a large mass in the left side of the pelvis, and a soft patulous os. No fluctuation could be obtained. Before section uterus was curetted and some decomposed placental tissue removed. Notwithstanding the great care used in opening the abdomen, the uterus was punctured. The contents of the left side formed one mass of inflammatory exudation, all the structures being glued together and adherent to the uterus and to the pelvic wall. The tissues were so friable and softened that it was with difficulty that ligatures could be applied without cutting. Before operation patient's temperature was $103\frac{3}{4}^{\circ}$, with a pulse of 130; the same evening, notwithstanding an operation of one

and a half hours, temperature had fallen to $99\frac{3}{4}^{\circ}$, pulse 110. On the evening of the eighth day, the temperature suddenly going up, a large pus-cavity was discovered which had followed the track of the glass drainage-tube. The result of this case also was favorable.

Case III. A woman at the end of her second puerperal period, which had been perfectly normal, was, after being given an enema, seized with intense abdominal pain with great general tenderness and vomiting. One small stool followed the enema, and her bowels did not again move. Symptoms of general peritonitis appeared, and on the following day the abdomen was opened for exploration. The woman died twenty-four hours after receiving the enema. At the examination of ovaries and tubes removed at the operation no marked change could be found. Careful search was made for volvulus and hernia, but no cause for these was discovered, and although water was injected into the rectum, all passed into the colon and ileum, none passing into the peritoneal cavity. The author not being able to make a post-mortem, could not conclude as to the cause of the trouble, but is inclined to think that a volvulus of the sigmoid was produced by the enema, which had untwisted, but not before some pyogenic micro-organisms had escaped into the peritoneal cavity.

Case IV. A healthy III-para. Two months after confinement, while nursing her child, was suddenly seized with a severe rigor, followed by abdominal pain and fever, which subsided in a week, only to recur in fifteen days. On operation a tubo-ovarian abscess on each side was found and evacuated. Patient made a perfect recovery.

In the fifth case symptoms resembling the above were present; this patient also recovered.

The writer thinks that greater caution against sepsis when attending confinements and miscarriages should be used. The technique of a case of midwifery should closely resemble that for a modern surgical operation. The experience gained from these cases demonstrates the utility of proper surgical treatment in properly selected cases.

THE EMPLOYMENT OF THE ELECTRICAL CUPPING-GLASS TO PRODUCE ABORTION.

MOLLATH (*Centralblatt für Gynäkologie*, 1893, No. 26) reports a very interesting case in which electricity, by means of a cupping-glass, was employed to produce abortion. The patient was a multipara with a flat rachitic pelvis. All her previous labors had been protracted, but otherwise normal. At her fourth confinement embryotomy had been performed on account of threatened uterine rupture. In her sixth parturition, a traumatic rupture of the uterus had taken place, this tear opening on the anterior and right side of the cervix wall and parametrium. The child was thrown into the abdominal cavity, being extracted through the tear. The woman recovered. Again becoming pregnant, the woman sought advice. On examination, a large amount of scar tissue was found extending along the vagina and cervix.

Abortion was decided on; the patient was then about three months pregnant. The electrical cupping-glass was used with the galvanic current, the application being made twice a day and for two minutes at a time, good

pains resulted, and in a few days the fœtus was expelled. The placenta was delivered manually. The woman did well. Eleven months afterward the patient again appeared, and pregnant. On examination the os was found firmly closed, uterus strongly retroflexed and moderately movable; patient was seven or eight weeks gravid. The cervix had a large amount of scar tissue and was very thin. After various methods of dilatation of the os had been tried, these methods extending over several days, galvanism was applied, five milliampères for twenty-five minutes (the constant stream three times in five minutes, with two pauses of five minutes' extent). Pains immediately began and continued for half an hour after the close of the sitting. This method was applied several times daily, the current being increased to ten milliampères at the ninth application. A bougie was now inserted into the uterus. Seven days after the first application of the galvanism the fœtus was expelled. Placenta expressed by the hand and uterus curetted. Puerperal period normal.

In applying this method, the author uses the constant current from a large Hirschmann's apparatus, and a cupping-glass such as is used on the breast. The cupping-glass being connected with the negative pole and placed on the breast, the large flat electrode is placed on the abdomen and connected with the positive pole.

SYMPHYSIOTOMY IN AN EXTREMELY CONTRACTED OSTEOMALACIC PELVIS.

DIMMOCK (*British Med. Journal*, 1893, No. 1695) reports a case in which symphysiotomy was done for osteomalacia. The patient, a Hindoo, had an irregularly contracted pelvis of extreme degree, the opening of the brim being a mere slit; the finger only being able to enter it. The external measurements were as follows: Highest points of crests, $8\frac{1}{2}$ inches; highest points of spines, 8 inches; between trochanters, $8\frac{1}{2}$ inches; external conjugate, 6 inches. After section the pubic joint sprang apart to a distance of about $1\frac{1}{2}$ inches. The space at the pelvic brim being even yet too small, the foetal head had to be perforated; this was done by trephining, and the head extracted with cranioclast. It was noticed that before the operation the horizontal rami of the pubes were in close approximation, so that the shape of the opening of the brim was in the form of a triangle; but when the joint was cut through they separated to a certain extent, and the conjugate diameter then measured about $2\frac{1}{2}$ inches. After delivery the bones were perforated by a drill; but the bone close to the symphysis was so softened by the disease that it was resolved to abandon the idea of fixing the bones by silver sutures, and finding that the cut surfaces of the joint could be approximated by moderate pressure, the wound was brought together by deep wire sutures passing close to the bone, with superficial sutures between them. Patient made a good recovery, the only complication being a slight rise in temperature, relieved by the passing of some *ascaris lumbricoides*. The bones united firmly.

A CASE OF UTERINE INVERSION.

ABEG (*Centralblatt für Gyn.*, 1893, No. 20) relates the case of a primipara, thirty-three years old, who came under his care suffering from inversion of

the uterus. Three weeks before she had been delivered by a careless nurse. At time of entrance patient was in an anæmic condition, with a temperature of 36.9° C., pulse 96-100, and a loud systolic basic heart-murmur. Internal examination showed the uterus inverted in the vagina, the mouths of the tubes showing plainly. There was no history of rheumatism. During the next four days attempts at replacement were made by means of the colpeurynter and strips of iodoform gauze, which efforts on the morning of the sixth day were successful, the uterus suddenly going back into its normal position. The heart murmur proved to be due to anæmia. The patient had during the three preceding weeks lost considerable blood in small amounts. The writer considers the colpeurynter an effective means of replacing an inverted uterus.

A PREGNANT UTERUS BICORNIS.

RATCLIFFE (*British Medical Journal*, 1893, No. 1695) exhibited specimens taken from a woman, aged thirty, who had been killed by an accident. On post-mortem the two pear-shaped horns of the uterus were found lying completely in the true pelvis. The rectum was mesial, and separating the two horns was a median recto-vesical fold two inches high. The right horn was four and one-eighth inches long, with a circumference of six inches, and its cavity showed a well-marked decidua, but no fœtus. The left horn was four and one-half inches long, with a circumference of six and one-half inches, and it contained a fœtus between the second and third months of gestation. The right ovary (that on the opposite side to the pregnant horn) showed a true corpus luteum, and there was none in the left ovary. The two uterine cavities were joined by narrow necks into a shallow cervical cavity about one-fourth of an inch deep, and freely patent into the vagina, which was partially double. On the upper and lower walls was a raphé not united. The woman menstruated regularly up to the time of her death.

PLACENTA PRÆVIA ASSOCIATED WITH UNUSUAL SIZE AND SHAPE OF PLACENTA.

BOXALL (*Ibid.*) exhibited two specimens, in both of which the fœtus had been extruded, together with the placenta, in an unruptured sac, one at the eighth and the other at the sixth month of gestation. Both women were secundiparous. In the first specimen the placenta was larger than usual, and covered about one-third of the fœtal envelope, and, in addition, was elongated in a downward direction, so that, though as a whole the placenta maintained a normal position, the lower end of it projected in front of the fœtal head, and thus, by encroaching on the dangerous zone, gave rise to hemorrhage for five days before the expulsion of the mass. The whole of the chorion was missing, having separated from the margin of the placenta, and was probably passed with clots. In the second specimen the placenta was spread over the lower half of the fœtal envelope, and was so thin that, though it filled the lower segment, the head could be easily felt through it. The case was further complicated by a fibroid tumor of the anterior uterine wall. Some hemorrhage had taken place.

RUPTURED UTERUS AND VAGINA.

ROUTH (*Ibid.*) reported the case of a woman in which the house physician of the Charing Cross Hospital Maternity Department had performed version for an arm presentation, and delivered the child without much difficulty. The woman then became collapsed. There was some hemorrhage externally and symptoms of internal bleeding. It was found on examination that the vagina and the lower released uterine segment were badly torn; the umbilical cord passed through the rent. Intravenous injections of warm salt solution were tried, and the patient made more comfortable, but later she developed septic pleurisy and a parotid bubo, and died on the eighth day.

DISTENTION OF THE VAGINA AND UTERUS, WITH MUCO-PURIFORM FLUID, ACCOMPANIED BY DILATATION OF THE BLADDER AND URETERS.

ECCLES reports, in the *Transactions of the Obstetrical Society of London*, the case of a second child of healthy parents in which, a few days after birth, a large tense swelling appeared in the vagina. About two months later the abdomen began to swell and become tympanitic. Vomiting was present. The child had retention of urine, but by means of a catheter a pint of clear urine was drawn. Rectal examination showed a tense mass lying in front of the anterior wall. The child eventually died, and post-mortem revealed a dilated vagina containing some ounces of muco-purulent fluid. The bladder was dilated and much hypertrophied. Uterus increased in size, but neither Fallopian tube was distended. The vagina was occluded at its lower end, its cavity measured four inches by three broad, and four inches from before backward. The cervix uteri would easily admit the little finger. Both ureters were dilated, and the kidneys hydronephrotic to a marked degree.

FŒTAL URINE A POSSIBLE SOURCE OF THE LIQUOR AMNII.

HELME (*British Medical Journal*, 1893), in an article on the intra-uterine secretion of urine by the fœtus, gives an analysis of urine passed by a child immediately after birth and before it had breathed. The urine was passed spontaneously.

Specimen 1 (half-ounce): No sugar; no albumin; no phosphates; no sulphates; chlorides present; urea present, 0.15 per cent., or 0.66 grains to the ounce; kreatinin present.

In another specimen, taken eight and one-half hours after birth, the examination was as follows: No sugar; no albumin; no phosphates; sulphates present; chlorides present; urea present, 0.3, or 1.32 grains to the ounce; kreatinin.

These analyses show that urea is present in considerable quantity in the urine of the normal living fœtus. It follows, therefore, that this urine is a possible source of the urea found in the liquor amnii, and that the fœtal renal secretion is a possible source of the liquor amnii itself. Kreatinin is known to be present in small amount in the amniotic fluid, but its presence in fœtal urine is especially interesting. Formulating his conclusions he sums up as follows:

The foetal kidneys secrete actively during intra-uterine life.

The urine of the normal living foetus contains urea and kreatinin.

The foetal renal secretion is a possible source of origin of the liquor amnii; this is shown by the presence of the above substance in both fluids. The presence of sulphates and phosphates in the liquor amnii, and their absence in the foetal urine, would point to there being an additional source of origin of the liquor amnii. The amount of urea and kreatinin excreted in the urine undergoes a marked increase during the first few hours after birth.

POISONING BY THE SELF-ADMINISTRATION OF "DIACHYLON" LEAD PLASTER FOR PROCURING ABORTION.

POPE (*British Medical Journal*, No. 1696, 1893) reports two fatal cases resulting from the taking of "diachylon" lead-plaster.

In the first case, a married woman, no history of lead-poisoning could be found, and although analysis after death produced no trace of the metal, incineration of a portion of one kidney showed its presence.

An examination of the body of the second case, which occurred some time after the first, showed the skin and conjunctivæ of a yellowish color; nothing abnormal could be found in the brain or other organs, except the intestines, which were contracted and contained a yellowish sticky fluid.

Both cases during life had had abdominal pain and tenderness, lost or weakened reflexes, although sensation was good; the characteristic blue line showed upon the gums of both.

In each case toward the close of life a spasm took place, the first dying in coma, the second from paralysis of the diaphragm.

In the first case considerable suspicion, and in the second direct evidence, showed that this preparation was taken with the idea of procuring abortion. Great care should be exercised by druggists in dispensing these preparations.

FOUR CASES OF EXTRA-UTERINE PREGNANCY.

MACKENRODT, at a meeting of the Gesellschaft für Geburtshülfe und Gynäkologie in Berlin (*Centralblatt für Gynäkologie*, 1893, No. 22), reported four cases of extra-uterine pregnancy, at the same time exhibiting specimens.

In the first case the tumor was found in the right tube, and a microscopical examination showed the presence of chorial villi. No trace of a foetus could be found. The left tube was also enlarged and thickened, presenting symptoms of inflammatory change.

The second patient, aged thirty-one years, had symptoms of pain and hemorrhage, which had existed for some time. A tumor the size of a fist could be felt behind and to the left of the uterus, quite near it. The tube contained many villi, but no foetus. Both the above cases recovered.

A right tubal pregnancy with pyosalpinx of the left tube was present in the third case. The foetal sac had ruptured, causing considerable bleeding into the abdominal cavity. There was atresia of the tube, the ampulla containing an isolated collection of pus the size of a hazelnut.

The fourth case was interesting on account of the blood found in the abdominal cavity, which could not be accounted for, as the left tube, which

contained the pregnant sac, was not ruptured; there had been an old peritonitis. Considerable change and thickening had gone on in the right tube. Patient recovered.

He also reports a fifth case in which a patient, twenty-eight years of age, was being treated for cervical catarrh. Menstruation was absent. Considerable pain was felt in the right side, and examination showed an enlargement of the right tube, soft in character. Pressure on the breasts showed that colostrum in large quantities was present. Operation showed no pregnancy present, but the right tube was the thickness of two thumbs, and filled with pus. The fimbriated extremity was flattened and adherent to the cæcum. This patient recovered, but only after a considerable period.

A CASE OF CÆSAREAN SECTION.

KEITH (*British Medical Journal*, 1893, No. 1696) gives his experience in operating upon a secundipara. The woman was small in size, and had an available conjugate of but three inches or under; the lateral space was diminished, and the descending rami of the pubes were fixed at a very acute angle. Both symphysiotomy and Cæsarean section were discussed, but owing to the peculiar shape of the pelvis, and particularly the pubic arch, the latter operation was decided on. It is futile, the author says, to give exact directions as to the position of the abdominal incision; it must be made entirely in regard to the situation and size of the uterus, bearing in mind that the section of that organ is to extend downward from close to the fundus. After delivery of the child the uterus contracted well, and after all the stitches had been introduced and tied, very little pressure was required to cause complete contraction. The Fallopian tubes were ligated, the ovaries not being interfered with. The writer discusses the various details of the operation, and concludes his article by saying that the question does not seem now so much to lie between the Porro and the Cæsarean operation, but between the latter and the division of the symphysis; the comparison, however, is limited, as with a conjugate of less than two and five-eighths or two and three-quarters inches, symphysiotomy is useless. In the hands of those accustomed to operations, Cæsarean section must be one of the most simple of all operative procedures.

SCARLET FEVER IN PREGNANCY, WITH INFECTION OF THE FÆTUS.

BALLANTYNE and MILLIGAN (*Edinburgh Medical Journal*, July, 1893) record the case of a primipara, twenty years old, who was found on the physician's visit to be suffering from a typical scarlatinal sore-throat. At this time she was about seven months pregnant. Later the usual rash and temperature appeared, the former being decidedly marked on patient's chest and limbs. Two days later labor set in. The early stages of the parturition were normal, but the expulsion was somewhat delayed by weak uterine contractions. There was also some hemorrhage. The disease ran a typical course and in six days desquamation began.

The infant when born showed all the signs of immaturity; it was small in size and its nails were imperfectly formed. It was, however, born alive and cried, although feebly. As at birth it was covered by a thick layer of vernix

caseosa, the condition of the skin could not be seen, but later it was found that it also had, not, as was first supposed, the physiological redness of the newborn, but scarlatina. It moaned at intervals and was restless. The skin was red all over the body, but especially on the shoulders and thighs. Desquamation began at about the same period as in the mother. Both patients entirely recovered. After giving a general view of the literature of scarlet fever in pregnancy, the writer formulates the following conclusions:

1. When scarlatina occurs in pregnancy, the fœtus *in utero* is usually, but not invariably, affected.

2. It would seem as if the infection of mother and fœtus is practically simultaneous, for the infant at birth shows the fever in the same stage as that reached in the mother, and desquamation usually occurs at the same time in both.

3. The clinical features of scarlatina in the fœtus and newborn are the same as in later life; but the diagnosis is rendered difficult by the resemblance these symptoms bear to the normal conditions (erythema, desquamation, etc.) met with in the neonatal state.

4. The prognosis as regards both mother and fœtus is grave, but death does not invariably occur. The supervention of septicæmia is the greatest danger, and the chief treatment should be its prevention.

PUERPERAL SEPTIC INTOXICATION (SAPRÆMIA): ITS SYMPTOMS AND TREATMENT.

MCCANN (*Lancet*, 1893), in discussing the subject of septic intoxication in puerperal women, considers that in order to obtain a thorough conception of the nature of the malady it is necessary to draw analogies from general surgery and to look upon a puerperal woman as having undergone an operation—labor—of greater or less severity, and as possessing a wounded surface in various stages of the healing process. Putrefaction becomes a predisposing cause of septic infection—first, by exciting inflammation and suppuration, thus providing a suitable medium, the inflammatory exudation or pus, in which pathogenic organisms may develop; and secondly, by lowering the vitality of the tissues, in consequence of which they are more readily invaded by the pathogenic fungi. The effects of putrefaction are local and general: the former consist of septic inflammation and suppuration dependent upon the irritation caused by the chemical products of putrefaction; the latter of a febrile affection.

The poison which is the product of the action of saprophytic organisms (they do not multiply in the blood) does not increase in the system, the effects being proportional to the dose. If the dose be small and the period during which absorption continues short, the resultant affection is known as "sapræmic fever." This form is most frequently met with among puerperal women.

Among the most common symptoms of septic intoxication are frontal headache, drowsiness, and a feeling of fatigue like that due to physical exertion, but also frequently accompanied by sleeplessness; general gastric disturbance, with jaundice. These symptoms are often present when the temperature is only slightly elevated; as the disease progresses there is a

further elevation up to 102° or 103°. Rigors, common in septicæmia, are rare in sapræmia. The fever is of a more continued character, marked daily variation being absent. Pulse-rate accelerated.

The lochia may or may not be foul; although the external discharge may not show signs of putrefaction, that which is pent up in the uterus may be foul in odor.

As regards treatment, it is necessary as far as possible to remove the septicity of the lochial discharge and to increase the elimination of the poison absorbed. For the first the author recommends the use of a continuous douche of half a pint of 1 : 2000 sublimate solution, or one pint of 1 : 4000 at a temperature of 115°, to be followed by the injection of boric acid or distilled water. During this process the patient's shoulders should be raised to secure good drainage. For the second the bowels should be kept open by means of sharp purgation, and diaphoresis secured by Dover's powders.

GYNECOLOGY.

UNDER THE CHARGE OF

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THE NORMAL ENDOMETRIUM.

HOFMEIER (*Centralblatt für Gynäkologie*, 1893, No. 33) criticises Wyder's statement that the cilia of the corporeal epithelium have a motion from the os internum toward the tubes. Not only were his own studies conducted upon fresh uteri removed from mammals, in which the conditions ought to be the same as in the human female, but he also examined organs removed at the operating-table and at once immersed in warm saline solution. In several of the latter he demonstrated conclusively by removing strips of endometrium and placing them under the microscope, that minute particles of charcoal were invariably carried by the ciliary movement *from the fundus toward the os internum*.

LIGATION OF THE UTERINE ARTERIES IN CASES OF FIBROMYOMA.

KÜSTNER reports two cases of uterine fibroid in which he ligated the uterine arteries per vaginam, having in one instance been obliged to abandon a total extirpation after opening the vaginal fornix. In both cases the tumor diminished in size within a few weeks, and the hemorrhages ceased. Whether the tumor continues to diminish to the same extent as after castration is as yet a matter of conjecture.

In another case the uterus was generally enlarged (though no fibroid could be detected), measuring five inches in depth, while the patient had profuse hemorrhages. Curettage was performed without benefit. The uterine arteries

were then ligated, when the bleeding ceased, and the uterine cavity measured only three inches at the end of six weeks. This seemed to show that the operation has a useful application in cases of uterine enlargement, with menorrhagia, other than fibroid degeneration. It would be indicated only in those which are obviously too obstinate to be cured by the ordinary means, such as curettage, amputation of the cervix, etc. As regards the technique, the writer differs somewhat from Gottschalk, preferring to incise the vaginal vault and to actually expose the arteries before passing the ligatures; the vaginal wound is closed after these are tied and cut off.

ICHTHYOL IN GYNECOLOGY.

SCHULTZ (*Orvosi Hetilap; Centralblatt für Gynäkologie*, 1893, No. 36), after observing thirty-five cases for two months, reports that he found a ten per cent. solution of ichthyol in glycerin, applied on tampons, especially valuable in the treatment of pelvic exudates and chronic oöphoritis and peri-oöphoritis. Nineteen patients were cured and twelve were relieved. In four cases of acute perimetritis the result was negative, from which he argues that the drug is contra-indicated in acute pelvic inflammation. Its analgesic action was most marked, being noted during the first week of treatment.

POLACCO (*Int. klin. Rundschau*, 1892, 45-50), as the result of a series of 972 observations in Mangiagalli's clinic at Milan, extending over a period of fourteen months, arrives at the following conclusions: Ichthyol is the most powerful local analgesic yet known in gynecological therapeutics. It has an undoubted absorptive power in cases of pelvic exudation, its action being directly proportioned to the early stage at which it is used.

INTESTINAL OBSTRUCTION.

STRATZ (*Zeitschrift für Geb. u. Gyn.*, Bd. xxv., Heft 2) analyzes ten cases—five in his own practice—in nine of which ileus was due to peritoneal adhesions, and in one to the presence of an ovarian cyst with a long pedicle. Cœliotomy was performed in every case, with two deaths. He believes that the infrequency of intestinal obstruction within the pelvic cavity, notwithstanding the common occurrence of perimetritis, is due to the presence of constant peristaltic movements. When intestinal adhesions occur, they develop so slowly that the gut has time to accommodate itself to abnormal conditions, especially to a certain amount of compression.

The diagnosis depends upon the presence of intense localized pain associated with intestinal disturbance. Suspicion would be awakened by the presence of a sensitive intra-pelvic tumor, with these symptoms. The ascites, which so commonly accompanies malignant disease, seems to prevent to a considerable extent the formation of adhesions. Abdominal section and the thorough separation of adhesions is the only treatment for ileus. It should not be delayed too long.

REICHEL (abstract of monograph in *Centralblatt für Gynäkologie*, 1893, No. 37) thinks that sepsis is the true cause of ileus, the existing paralysis of the gut being due to the action of toxic germs upon the intestinal ganglia. The cause is clear in well-marked cases of peritonitis; but when there is

little or no elevation of temperature, and the patient dies of obstruction in from six to ten days, sepsis is often unsuspected, the true condition being revealed at the autopsy.

In his experiments upon dogs and rabbits the writer found that if a simple bend was made in the gut, by suturing the opposed peritoneal surfaces, the normal peristaltic movements were sufficient to overcome the obstruction. In man, however, the greater thinness and elasticity of the wall of the gut is not so favorable to the restoration of its normal calibre.

The majority of cases of acute obstruction follow abdominal section, and are due *not* to the formation of adhesions, but to sepsis.

In ileus from twist of the gut there are three factors which cause the obstruction—injury to the nerves of the intestine, disturbance of the circulation, and, as a result of the latter, bacterial infection of the peritoneum. In the majority of the cases of ileus the actual stenosis is slight.

The symptoms of obstruction begin to appear when the circulation in the affected loop is disturbed and peritonitis results. Practically, it is impossible to state in what cases the prognosis is most favorable after abdominal section. The writer believes that the great mortality is due to the fact that operative interference is so often delayed too long.

COMTE (*Revue m d. de la Suisse Rom.*, 1893, 3, 5) mentions as diagnostic points localized pain, tumor, and the fact that the portion of gut immediately above the point of obstruction is distended, and is the seat of peristaltic movements, as pointed out by Schlange. Wahl, on the contrary, thinks that peristaltic movements are only present when the ileus is due to pressure, as from a tumor; in true strangulation by adhesions there is no peristalsis in the proximal portion of the gut. C liotomy is the only treatment. If necessary, the intestines should be turned out of the wound, and all adhesions separated between ligatures to prevent hemorrhage. It is rarely necessary to resect the gut. If the point of obstruction cannot be found, an artificial anus should be established. If there is much tympanites, small longitudinal incisions should be made in order to evacuate the gas.

GONORRH EAL SALPINGITIS.

D DERLEIN describes a specimen of pyosalpinx in which both tubes contained gonococci, though it was evident that the inflammation in the left was more recent than that in the right. Yet the former appeared macroscopically to be entirely healthy at the time of the operation, being patent and containing no pus, so that doubt was felt as to the propriety of removing it. The result of the examination leads the writer to believe that in cases of gonorrh eal infection both tubes are usually affected, so that the surgeon should remove *both*, even though one is apparently healthy.

TACHYCARDIA AFTER C LIOTOMY.

MANGIAGALLI (*Annal di Ost. e Gin.*, 1892, No. 10) reports two cases of ovariectomy in which the pulse ranged from 180 to 200 for several days after the operation, there being no elevation of temperature or evidences of sepsis. One patient died in collapse on the fifth day, while the other recovered. The author thinks that the phenomenon may have been due to the action of antiseptics upon the peritoneum and hence upon the sympathetic ganglia.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

EDWARD F. WILLOUGHBY, M.D.,
OF LONDON,

AND

CHARLES HARRINGTON, M.D.,
INSTRUCTOR IN MATERIA MEDICA AND HYGIENE, HARVARD MEDICAL SCHOOL.ACTION OF COMMON AND MEDICATED SOAPS AND OF CORROSIVE
SUBLIMATE ON THE BACILLUS OF CHOLERA.

IN the *Hygienische Rundschau*, of August 15th, DR. GUNNING, Professor of Hygiene in the University of Amsterdam, gives an account of experiments conducted in his laboratory by Dr. Nijland, of the Dutch East Indian Army, on the action of common and medicated soaps and of corrosive sublimate on the bacillus of cholera diffused in ordinary river water, which appear to involve far wider issues than those which prompted them, viz.: the dangers apprehended from the use for ablution of the water of the river Vecht, in the event of a recurrence of the cholera epidemic at a time when the scarcity of the purer "Dune" ground-water should necessitate its employment for culinary and drinking purposes only. Dr. Nijland used Vecht water, to which were added agar-agar cultures of the bacillus or vibrio of cholera. The general conclusions were that while they soon died out of pure water, the greater the organic pollution present the longer did they retain their vitality and the larger the amount of germicides required for their speedy destruction, such reagents being almost useless in diarrhoeal evacuations.

Ordinary soaps dissolved in Vecht water in the proportion of 1.8 per mill. did not destroy them within fifteen minutes, 2.4 parts per mill. being necessary to do so with certainty in ten minutes. So-called disinfecting soaps, containing 3 to 5 per cent. of carbolic acid, salicylic acid, creolin, etc., were no better, if so good. But 2.4 per mill. in a bath of 120 to 150 litres means the consumption of 290 to 360 grammes, whereas the soap commonly used does not exceed 9 to 24 grammes.

But when only 0.12 per mill. of a soap containing 1 per cent. of sublimate was dissolved in water charged with cholera bacilli (2000 to the cubic cm.) no more than 100 were alive after the lapse of one minute, and none at all in five; while 0.006 and even 0.003 of the pure sublimate was sufficient, and the addition of a little salt rendered it still more active.

Dr. Gunning recommends its employment in the form of "pastilles" or tabloids containing 5 mgrs. each, one or two to be used, according to the size of the bath; no possible danger could be incurred by such practice, since the maximum dose for internal administration is as high as 20 mgrs.

For the sterilizing of choleraic or typhoid stools, sublimate is, however, practically useless, from its coagulation of the albuminoid matters in which the bacilli become imbedded and in fact protected.

DIPHTHERIA AND CROUP, AND "DIPHTHERITIC" THROATS.

In the report of the medical officer of the Local Government Board, DR. KLEIN describes the clinical phenomena and bacteriology of eight cases of ordinary typical diphtheria, "croups" of different forms, and of so-called "scarlatinal diphtheria," illustrating in the most remarkable manner the value of the determination of the presence or absence of Löffler's bacillus as a means of diagnosis. Bretonneau recognized the "false membrane" as essential, in fact as constituting the disease; Virchow divided all cases of pharyngitis and laryngitis into catarrhal, fibrinous, and diphtheritic, and later pathologists have defined his fibrinous exudations as superficial, and his diphtheritic as those infiltrating and inducing more or less necrosis of the mucous and sub-mucous tissues. But all these are differences of degree, not of kind, and apart from the doubt attaching to mild cases of these as of any other diseases, there are at least three sets of problems with which the physician is frequently brought face to face, and which he cannot solve on clinical evidence alone. These are to distinguish—1, the true nature of foul sore-throats, certainly infectious, but with no definite exudation, few, if any, terminating fatally—such cases occurring either alone, or before, during, or after an epidemic of virulent and fatal diphtheria; 2, cases of "scarlatinal diphtheria," *i. e.*, of scarlatina in which all the visible phenomena of diphtheria supervene on those of scarlatina concurrently with or subsequently to the primary disease; and, 3, to differentiate between laryngeal diphtheria and "membranous croup," to say nothing of the catarrhal and spasmodic forms.

Of course, the neuroses or paralytic symptoms are absolutely characteristic of diphtheria, but they are often absent and always appear too late for actual diagnosis.

There can, however, be no longer any doubt that the bacillus of Löffler is the essential cause of diphtheria, that it never occurs in any other disease, and that it will always be found in the true diphtheria, however vague the clinical symptoms, if, and this is no small advantage, only it be looked for early enough. After the third day numerous foreign microbes make their appearance, and may even crowd out the specific one, but *before* that date the exudation may present an absolutely pure and abundant culture.

For the morphology of the bacillus recourse may be had to works on bacteriology, but it is also remarkable for its stability, no very appreciable modification of its form, or diminution of its luxuriance, and none whatever of its virulence being induced even by *acid* broth in cultures carried to the twentieth remove.

Dr. Klein's examination of the scarlatinal cases fully confirmed the conclusions of Babes, Escherich, Holzinger, Wurtz, and others, that, although simultaneous infection with diphtheria and scarlatina is possible, it may be laid down as a rule that diphtheritic symptoms appearing as a sequel to the fever—that is, after one, two, or three weeks—are true diphtheria, and will yield the bacillus in question; but that the like symptoms occurring as a complication, that is, in the course of the fever, are not, and though the streptococcus of scarlatina may be present, Löffler's bacillus will be looked for in vain.

Dr. Klein sums up his conclusions as follows:

1. Membranous croup of the larynx and trachea occurring concurrently with diphtheria of the fauces is *true* diphtheria.
2. The so-called scarlatinal diphtheria is not true diphtheria.
3. Diphtheria of the fauces and membranous croup, following sometimes after scarlatina, are both true diphtheria.
4. Membranous croup of the larynx and trachea, without diphtheria of the fauces, may be of two kinds: *a*, true diphtheria, or *b*, genuine fibrinous croup without the presence of the diphtheria bacillus, and therefore not true diphtheria.

Bretonneau himself had shown long ago, as have Reitz and others since, that a fibrinous *membranous* but not infectious exudation might be produced experimentally by a (chemical) irritant, and there is therefore no reason why it should not have a pathological though not a specific origin.

THE CHEMICAL PATHOLOGY OF DIPHTHERIA.

WHILE Dr. Klein was determining the value of the Klebs-Löffler bacillus in enabling the physician to come to an early and positive diagnosis among doubtful "diphtheritic" and "croupous" cases, DR. SIDNEY MARTIN has been engaged in a study of the chemical products of the bacillus in the human body and in culture fluids, and their physiological actions on rabbits. Beginning with the first, he extracted from the blood and spleen of persons who had died of the several forms of diphtheria, pharyngeal, laryngeal, and nasopharyngeal, by means of alcohol alone, an albumose (deutero-albumose) and an organic acid. The latter is remarkable, since in anthrax, etc., the albumose is associated with an alkaloid. The albumoses (allied to digested peptones) cannot be distinguished from one another by chemical tests, but are easily distinguishable by their physiological actions.

Subcutaneously injected the diphtheritic albumoses gave rise to transient edema with no tendency to necrosis, and a well-marked rise of temperature, a lesser degree of fever persisting for three or four days; the intensity, duration, etc., of these phenomena, and the termination in recovery or in death, depending, *inter alia*, on the strength and number of the injections.

More striking and characteristic than the pyrexia or the great retardation of the coagulation of the blood were the loss of weight and the muscular paresis identical with the paralytic symptoms so frequently met with in diphtheria.

Careful preparation of the nerves, and especially of the muscular and peripheral branches of those of the hind limbs, of the experimental animals (as well as of some from fatal cases in man) showed conclusively that these symptoms were due to progressive degeneration and atrophy of the axis cylinder, the sheaths being recognizable and intact. The loss of weight was remarkable, amounting in some cases to from one-quarter to one-half of that of the body, even after two injections only. It bore no proportion to the fever, and continued without interruption for a week, or in one case for ten days after the temperature had become perfectly normal, and what was still more surprising, it was not attended with any manifest wasting of the paralyzed muscles.

The organic acid had a similar action, but incomparably larger doses were required.

Roux and Yersin had from artificial cultures of the bacillus and subsequent sterilization of the fluid by passing it through a Pasteur-Chamberland filter, obtained a poison of such virulence that when inhaled and dried 0.0002 gramme was sufficient to kill a rabbit of three kilos in weight. From the fact that such minute doses exerted a prolonged action on the living organism, and that exposure to a temperature of 100° C. destroyed its properties, they rightly concluded that it was a ferment (diastase) which, locally produced by the bacilli, leavened the entire mass of the blood, or, as they express it in one of their papers:

“L'infection n'est produite par un microbe envahissant les tissus, mais par la diffusion dans l'organisme d'une substance toxique, préparée à la surface d'une muqueuse, pour ainsi dire, en dehors du corps.”

They, however, in Dr. Martin's opinion, committed an error in using as a culture fluid veal-peptone broth, a medium unlike anything to be found in the living tissues; they thus obtained a product resembling the poison of diphtheria, but artificially intensified. Dr. Martin, on the other hand, used a beef broth containing 1 to 2 per cent. of alkali albumin, but no peptone; in this the bacilli after twenty to thirty days' incubation at 38° C. converted the alkali albumin into albumoses in which small quantities of the organic acid, already referred to, were found. In short, they effected the same changes as are found in the fluids of the body.

Dr. Martin therefore concludes:

1. That the bacillus forms in the diphtheria membrane and in culture fluids products, viz., albumoses and an organic acid identical with those found in the tissues of persons dead from diphtheria.

2. That the physiological actions of single or repeated doses of these products, viz., fever, emaciation, and progressive muscular paresis due to degeneration of the peripheral nerves, are the same as those of the corresponding substances obtained from the tissues, and as the phenomena of the disease itself.

3. That the bacillus is therefore the primary infective agent in diphtheria.

4. That it liberates in the membrane a ferment which when absorbed digests the proteids of the body, forming albumoses and an organic acid.

5. That these are the immediate agents in the production of fever, paralysis, emaciation, and death.

6. That the relatively enormous quantity of these products found in the spleen (in diphtheria as in anthrax) is explicable by the larger proportion of proteids normally present—stagnating, so to say—in the blood of the spleen than in the general circulation.

[P. S. Does not this suggest a search for like secondary pathological poisons in the enlarged spleens of malarial, enteric, and other fevers, including influenza?—E. F. W.]

DISINFECTION OF LETTERS.

MR. WASHINGTON LYON (in a letter to the *British Trade Journal*, quoted by *Sanitary Record*, March 1, 1893) gives an interesting proof that steam is

admissible for disinfecting letters. All letters written from the Asylums Board Hospital in Kent are passed through the steam disinfecter before being mailed. In 1884 there were a thousand smallpox patients at the hospital camps, and the post-office authorities complained that so many of their employes were taken ill with smallpox. Since this method of disinfection was adopted no complaint has been made. Neither the ink, the gum of the envelope, nor the stamp is affected by this process.

ANTAGONISM BETWEEN THE BACILLUS PYOCYANEUS AND THE BACILLUS OF TUBERCULOSIS.

DR. KLEIN, some months before the forced and ill-advised announcement by Prof. Koch of the influence ascribed to certain products of the bacillus of tubercle in inhibiting the progress of tubercular disease, had already tried the effect of frequent injections of the sterilized fluid containing the chemical products of the artificial culture of the bacilli on the course of the disease, induced in animals by inoculation, but with completely negative results.

He then turned his attention to the products of the growth of the bacillus pyocyaneus. Evidence of tuberculosis having appeared in twenty-six guinea-pigs a month after inoculation with cultures from a human tubercular lung, he, on twenty-three successive occasions within about five weeks, injected (a) eight with sterilized culture fluid of tubercle bacilli, (b) eight with one of bacillus pyocyaneus, and (c) eight with a mixture of these, (d) the remaining two being retained as control animals. During the following month all died of tuberculosis except five of those that had been inoculated with the bacillus pyocyaneus. They, however, lost flesh and gradually succumbed in the course of the next six weeks. Though far from satisfactory, the results were so far encouraging, they showing that even in the very dilute form which he had employed the pyocyaneal products they had prolonged life, and greatly retarded the progress of the disease. He accordingly next injected eight guinea-pigs with tubercle as before; and on the manifestation of the disease in all, he injected six of them on thirteen consecutive occasions with undiluted broth cultures (sterilized) of bacillus pyocyaneus. The control animals had died of acute tuberculosis before these remedial injections of the others were nearly concluded, in fact within a month of inoculation; and one of those treated died soon after, with, however, far less post-mortem evidence of disease, but the remaining five were all alive and in very fair health and condition two months later, when they were killed for examination. The inguinal glands were found to be enlarged from old inflammatory thickening, but except a few gray points on the livers, and a minute nodule in the lung of one, there were no signs of the tuberculosis which all had manifested after inoculation. The same unequivocal arrest of the disease was observed in another series of four treated in like manner, although unfortunately they, with a number of others, were carried off by an epidemic of pneumonia.

The injections employed with such a degree of success were "three Pravaz divisions" of a sterilized broth culture of bacillus pyocyaneus, incubated for ten days at a temperature of 37° C., or that of the human body.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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BACTERIOLOGICAL DIAGNOSIS OF CHOLERA.

DURING the cholera epidemic of 1892 the large number of diarrhoeal diseases of various kinds simulating the graver malady, and from which they could be distinguished with certainty only by means of bacteriological examination, emphasized the importance of so simplifying the process of such examinations as to make their result attainable as quickly as should be consistent with accuracy. In view of the impending danger of another epidemic in Europe, KOCH (*Zeitschrift für Hygiene und Infektionskrankheiten*, 1893, xiv. Heft 2) presents the methods of examination for the cholera bacillus employed and found reliable at the Hygienic Institute of Berlin.

In the first place it is stated that in about one-half the cases of true cholera the diagnosis may be made from a microscopic examination of the rice-water discharges, occupying a few moments only. A small amount of stringy mucus is selected from a fresh stool, is fixed upon one or more cover-glasses by the ordinary method of drying and heating, and is stained with a diluted Ziehl's solution (carbolic fuchsin). In such a preparation the cholera bacilli may usually be seen either in "pure culture" or associated with the bacillus coli communis alone, from which its peculiar shape readily serves to distinguish it. The cholera bacilli are clustered in groups, the bacteria in each group lying more or less parallel to one another, or, as Koch expresses it, like fish swimming in a slowly flowing stream.

This simple procedure may in many cases be sufficient to confirm the diagnosis in suspicious cases. But, in the majority, for final proof, cultures will be made. The time necessary for these may be materially shortened by the use of Dunham's peptone solution (a sterilized alkaline solution of one per cent. peptone in one-half per cent. salt solution). Shreds of mucus from suspected stools are suspended in this solution at the temperature of the body for about six hours, at the expiration of which time, if cholera bacilli are present in any considerable numbers, the surface of the mucus becomes cloudy, owing to the rapid development of the bacilli. Such shreds may then be examined microscopically as described above, or may be used for the inoculation of gelatin or agar plates, in which the germs develop much more rapidly after the use of the peptone solution.

Koch considers the growth of the cholera bacilli on gelatin so characteristic as to make the gelatin plate an important diagnostic aid, though on account of the lower melting-point of gelatin the growth may be more rapidly forced on agar, which may be kept at the body temperature. Thus on agar, colonies sufficiently developed for diagnostic purposes frequently appear in from

eight to ten hours when the inoculation has been from material previously immersed in the peptone solution. The agar plate then, combined with the peptone solution, affords the speediest reliable method of diagnosis.

High diagnostic value is also attributed by Koch to the "cholera red" reaction when carefully carried out. The peptone culture affords the best material for it. The culture should be pure, should contain nitrates in abundance, and the sulphuric acid employed should be chemically pure.

At the conclusion of his paper Koch describes a new method for the detection of cholera bacilli in water. Large quantities of the water to be examined are treated with peptone and salt in such quantity as may be necessary to establish the proportions of the peptone solution, and are then kept in ovens at the temperature of the body for from ten to twenty hours, after which agar plates are prepared. Suspected colonies are examined microscopically and are further cultivated. By this means Koch has repeatedly been able to detect cholera bacilli in water after other methods had failed.

IMMUNITY : HYDROPHOBIA, GLANDERS.

It will perhaps have excited surprise that in our discussion of immunity Pasteur's work upon hydrophobia has had no mention. This is because the immunity obtained by Pasteur is brought about by the use of an attenuated virus, and appears, therefore, to depend for its production upon a principle quite distinct from that under discussion—the antitoxin theory of immunity. It is not to be inferred from this, however, that the attenuated virus theory and the antitoxin theory are necessarily irreconcilable, for the experiments about to be related, as well as those of Behring and Kitasato, and Brieger and Fraenkel upon diphtheria and tetanus, and those of the brothers Klemperer on pneumonia, all show a close relationship between the immunity produced by both methods, in that the blood-serum (presumably containing an antitoxin) of animals immunized by repeated injections of attenuated virus has been shown to confer immunity. But granting this suggested relationship, the experiments of Pasteur bear in no way directly upon the antitoxin theory. Some interesting observations upon hydrophobia, published by Tizzoni and his pupils, and by Babes and Cerchez, add weight to this theory, however, and must be briefly summarized.

In August, 1891, TIZZONI and SCHWARZ (*La Riforma Med.*, 1891, No. 196) made a preliminary report of experiments which were augmented and published at length in January of the following year (*ibid.*, 1892, Nos. 18, 19, 23, 25). In these experiments rabbits were made immune to rabies by treatment with attenuated virus obtained from the medulla oblongata of rabbits which had succumbed to the virulent poison, or *virus fixe* as it is called. The blood serum of animals thus immunized was found to be capable of conferring immunity to other rabbits when injected into the jugular vein in doses of about 5 c.cm., but the blood of the animal so immunized was incapable of further communicating immunity to a third generation. Experiments with immune dogs showed the protective power of their blood-serum to be inferior to that of rabbits.

By treatment with alcohol, Tizzoni and Schwarz precipitated a substance from the serum of their immune rabbits, believed by them to be of the nature

of a globulin and similar in its action to that of the tetanus antitoxin in protecting from tetanus, though evidently distinct from the latter in that it had no antagonistic action to the poison of tetanus.

In October, 1891, only about two months after the appearance of the first paper by Tizzoni and Schwarz, BABES and CERCHEZ (*Annales de l'Institut Pasteur*, 1891, No. 10) described some interesting experiments on the action of the body juices of animals immune to rabies upon the *virus fixe* of the disease. Among other things they found that the blood-serum of immune dogs protected other dogs from inoculations of the virulent virus and cured two of four in which the treatment was begun *after* the inoculation of virulent virus into the brain. The importance of these experiments of Babes and Cerchez is enhanced by the fact that they were carried on quite independently of the Italian observers, and have even led to a dispute as to priority.

Encouraged by their success, Babes and Cerchez undertook the treatment of human subjects. Twenty-six persons had been badly bitten by a rabid wolf. The twelve of these most severely injured were given, in addition to the Pasteur treatment, four to six injections of 10 c.cm. each of blood-serum from two immune boys (laboratory helpers who had been immunized) or from immune dogs. That only one of those so treated died is strongly suggestive of the efficacy of the treatment, as the Pasteur method alone has given its most disappointing results in similar cases of wolf bites.

During the following year, 1892, it was discovered by Centanni (*La Riforma Med.*, 1892, Nos. 102 and 103) that repeated inoculations with attenuated virus were not necessary to the production of immunity to rabies in rabbits, but that by treating an emulsion of the medulla oblongata of rabbits which had died of rabies with artificial gastric juice a vaccine might be obtained which, while harmless in itself, had still a powerful immunizing action.

Working further with this method, TIZZONI and CENTANNI (*La Riforma Med.*, 1892, No. 109; also *Deutsche med. Woch.*, 1892, Nos. 27 and 31) demonstrated that the blood of animals made immune by this method was capable of conferring immunity in turn to others, and, furthermore, possessed marked curative qualities when injected into animals suffering from well-developed rabies. Experiments were made upon five rabbits suffering from rabies induced by injections of a virus which killed control animals in from fifteen to seventeen days. Intra-venous, intra-peritoneal, and subcutaneous injections of from 3 to 5 c.cm. each were given, beginning twice on the seventh day, once on the tenth, once on the eleventh, and once on the fourteenth after the inoculation, and when in all symptoms of the disease had already become more or less pronounced. All five of the animals recovered, and had remained healthy at the time of writing.

Efforts to separate the immunizing substance from the blood-serum resulted in the verification of the previous experiments of Tizzoni and Schwarz. Alcohol precipitated a substance which, when dissolved in water, was found to contain the immunizing principle, neutralizing the virulence of the *virus fixe* when mixed with it in the test-tube, and retaining the power of both conferring immunity and curing animals in the early stages of rabies. The substance thus separated is believed to be the specific antitoxin of hydrophobia, and Tizzoni and Centanni announce themselves as desirous to test the curative value of their remedy in a human case of the disease.

[Those desiring to acquaint themselves more fully with the work of Tizzoni upon this subject are referred to a paper by him, read before the British Medical Association in 1892, and published in the *British Medical Journal* of March 11, 1893, page 516.]

In connection with these experiments upon immunity to hydrophobia we may briefly notice some interesting attempts to protect horses from glanders, by injections of blood-serum of animals which had recovered from the disease, which have recently been reported by HELL (*Zeitschrift für Veterinärkunde*, 1892, Heft 12; cf. *Deutsche med. Woch.*, 1893, No. 7, 163). With a view to protecting the young horses of a hussar regiment from glanders, which had shortly before proved very destructive, Hell tried the experiment of injecting the blood-serum of horses which had recovered during former epidemics into the veins of those which he desired to protect. Fifty-four horses were thus treated, three of which were sick with the disease when the treatment was begun, the usual dose being about 40 c.cm., repeated until each animal had received about 300 c.cm. in the course of three weeks. None of the animals so treated was attacked with the disease, though kept in stalls where others had been sick before, and notwithstanding that an epidemic of the disease prevailed at the time in the regiment. Recovery was perfect in the case of the three animals affected with the disease before treatment.

Stimulated by these successes, TOEPFER (*Berliner thierärztlicher Wochenschrift*, 1893, No. 2) treated sixty horses on two farms where glanders was beginning to break out, with the result of stopping further progress of the disease and curing the animals already affected.

It would thus appear that the blood-serum of animals which have survived glanders possesses the power to protect animals exposed to the contagium of the disease and to cure those beginning to be afflicted with it. In a subsequent notice it will appear that similarly the blood of convalescents from typhoid fever is capable of preventing the lesions in animals usually resulting from inoculations of the typhoid bacillus.

TUBERCULOSIS OF BRONCHIAL LYMPH NODES IN ITS RELATION TO TUBERCULOSIS IN YOUNG CHILDREN.

To everyone acquainted with the terrible mortality of tuberculosis among young children, every effort to throw light upon the etiology of the disease, and thereby to increase our ability to curtail its ravages, must be most welcome. It has long been widely known that the bronchial lymph nodes are a very frequent seat of "scrofulous degeneration," as it was called by the older physicians, or of tuberculosis, as we now know it to be; and even before reports of cases began to appear in which the origin of a general miliary tuberculosis had been found in the rupture of such cheesy glands into one or more of the adjacent vessels, a close etiological relationship was believed to exist between these cheesy lymph nodes and the more widely distributed manifestation of the disease. Thoroughly convinced of the correctness of this view, H. NEUMAN (*Deutsche med. Wochenschrift*, 1893, Nos. 9-17) reviews the evidence in a carefully written article, discussing more particularly the manner in which the bronchial lymph nodes become affected.

This he believes to be possible in one of two ways only: either by direct hereditary transmission or by contagion. As the result of study of the

statistics of asylums and nurseries, he is led to consider the former of these methods to be very unusual, while, on the other hand, the theory of infection by inhalation affords a plausible explanation of many observed facts inexplicable by the other theory. For example, it is well known that inorganic particles of dust, and bacteria other than the tubercle bacillus, are frequently taken up by the bronchial mucous membrane, and are conducted by the bronchial lymphatics to the nearest lymph nodes, where they are deposited, and there is every reason to suppose that the same path is traversed by the tubercle bacillus when it finds entrance to the bronchial mucous membrane. The entrance of the tubercle bacilli is believed to be facilitated by any abnormality of the bronchial mucous membrane, and, once in the lymph channels, their onward progress would be more rapid in the congested lymphatics of inflammatory conditions. In this way Neumann explains the frequent sequence of tuberculosis upon measles and other diseases in which the bronchial mucous membrane is inflamed. Furthermore, the occurrence of acute inflammation of the lungs or bronchi is believed to materially contribute to the rupture of pre-existent cheesy glands, and to the consequent dissemination of the tubercular virus throughout the body.

The diagnosis of tuberculosis of the bronchial lymph nodes is attended with much difficulty, though in many cases quite possible. When it can be made with a fair degree of certainty, much light may often be thrown upon the nature of otherwise obscure infantile maladies. The diagnosis may be made when many bronchial glands are enlarged together, so that a bunch of considerable size results, giving rise to symptoms of compression upon the bronchi or on the adjacent nerves. Percussion may aid in the detection of large tubercular nodes in the anterior mediastinum, but is believed to be thoroughly unreliable when over the back. On the other hand, the occurrence of harsh, dry bronchial breathing over the root of the lungs behind, with the patient's mouth closed, is believed to be of much diagnostic significance. Neumann also describes a peculiar cough as characteristic of enlarged bronchial lymph nodes, resembling in its paroxysmal quality the cough of pertussis, but being of longer duration, and not communicable by contagion.

[In connection with this article, we would call the attention of those interested in the relation of cheesy bronchial glands to general tuberculosis in children, to a suggestive paper upon this subject by W. P. Northrup, in the *New York Medical Journal* of February 21, 1891.]

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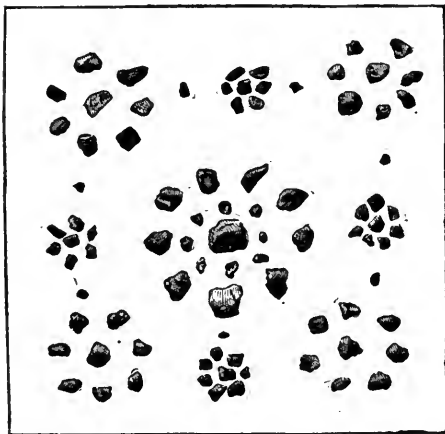


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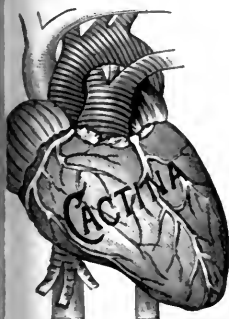
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